VOL. XVI, No. 7 CHICAGO, AUGUST 12, 1909 $3.00 PER YEAR

MOTOR AGE

ALGONQUIN CUP TO CHADWICK SIX

CHICAGO, Aug. 7—Beating one of the most brilliant fields that has started in a hill-climb this year, Len Zengel, in the Chadwick six, captured the Algonquin cup, offered for the fastest total time, independent of class, in the fourth annual hill-climb of the Chicago Motor Club at Algonquin, Ill., day before yesterday. But to get a leg on the trophy, in which Frank W. Leland in the Stearns also has an interest, Zengel had to break records on both hills. His margin victory was 2⅕ seconds over Greiner.

Algonquin Cup a Classic

The Algonquin cup is a classic that was put up a year ago by the residents of Algonquin, where the climb takes place, and the conditions are that it goes to the car making the fastest total time on the two hills, regardless of class. It is the chief bone of contention and the winner is regarded as the hero of the occasion. It first was put up a year ago and the first winner of it was Frank Leland. Leland, however, had the fight of his life to get it, there being only ⅗ second between him and George Salzman in the Thomas big six. The same car figured in the battle of last Thursday and it was Greiner in this same Thomas that was runner-up. As was the case with Zengel, Greiner also got inside record on Perry hill and tied Leland's mark on Phillips hill.

LEN ZENGEL, CHADWICK DRIVER

TIME HISTORY OF CLIMB

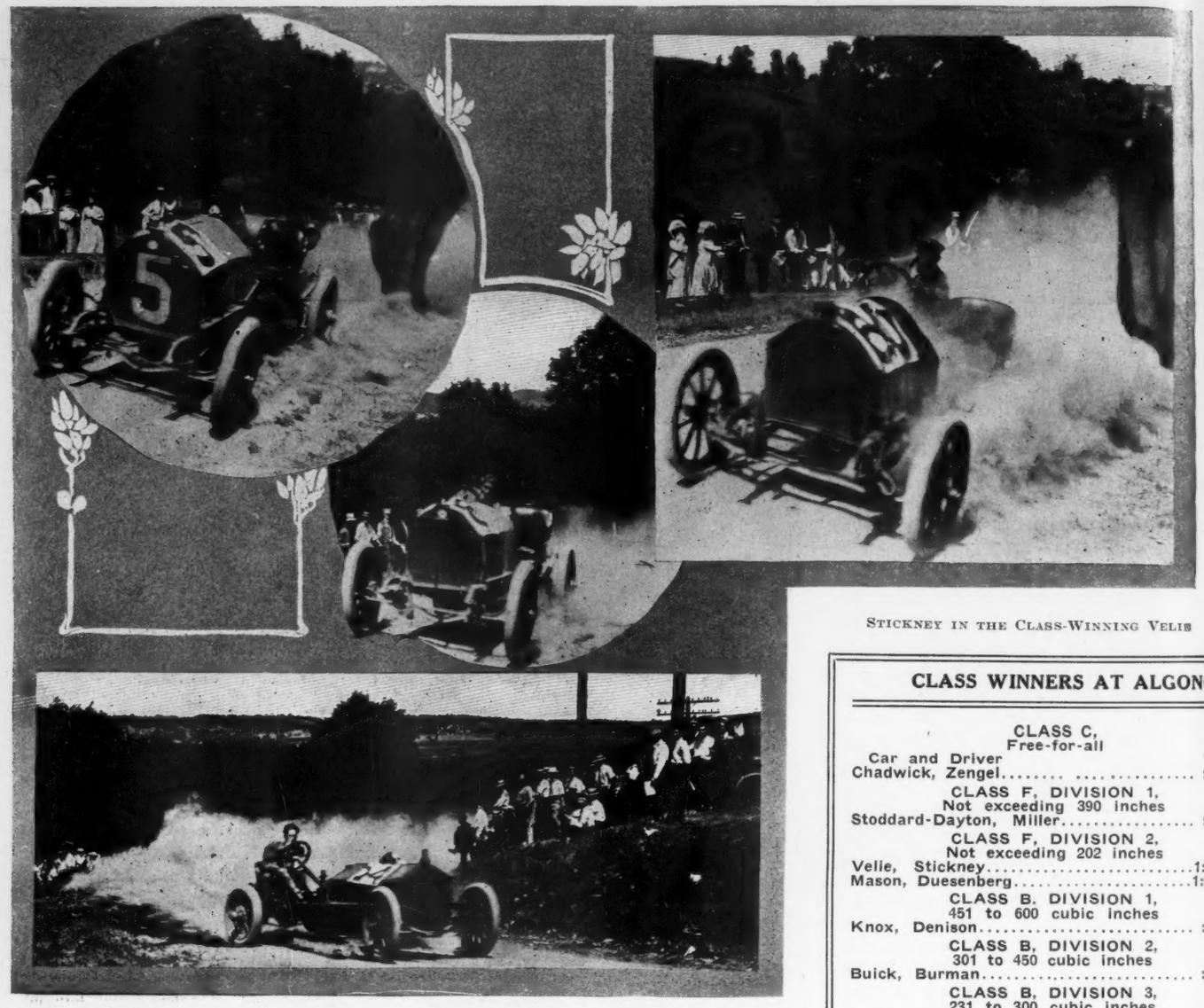
Four hill-climbing meets have been held at Algonquin and each year there has been an improvement in the time. In the first meet Paul Hoffman in a 40-45-horsepower, four-cylinder Pierce Arrow established a mark of :34 on Perry hill and his :46 2-5 on Phillips was shared with Frank Illsley in a 50-horsepower Stevens-Duryea six. In the meet of 1907 Frank Leland in the Stearns six climbed Perry hill in :26 1-5 and Phillips in :33 1-5. Last year both these were slashed, Bourque in the little Knox and McLain in the 48-horsepower Apperson tying at :24 1-5 on Perry, while the long hill in the afternoon was negotiated in :29 2-5 by Leland in the Stearns six. The 1909 meet also saw a smashing of records, Zengel in the Chadwick six going up Perry in :22 3-5 and Phillips in :28.

Big Field in Climb

Undoubtedly the Chicago Motor Club had the largest hill-climbing field of the season in this year's event, eclipsing in size even Wilkes-Barre. Eighty-five entries were made in twenty-two class events; seventy-one started and sixty-six climbed both hills. The McIntyre, Detroit electric and one of the Marions were the only real scratches, the other withdrawals being because of class conditions which prevented a stripped car competing in class A, the entrants preferring to drop out rather than take time to make the necessary changes.

As usual the meet was well handled, the only difficulty being to clear the hill of the sightseers and vehicles, which delayed the start both morning and afternoon. It had been planned to have the militia guard the course and the soldiers would have been available had it not been for the objection made by a neighboring village, which evidently did not like to see Algonquin get so much of the limelight. Still,

LEN ZENGEL IN CHADWICK SIX NEGOTIATING LAST TURN ON PERRY HILL IN MORNING CLIMB



UPPER CORNER, ENGLEBECK IN STODDARD-DAYTON; CENTER, MILLER IN STODDARD-DAYTON; BOTTOM, AITKEN IN NATIONAL

STICKNEY IN THE CLASS-WINNING VELIE

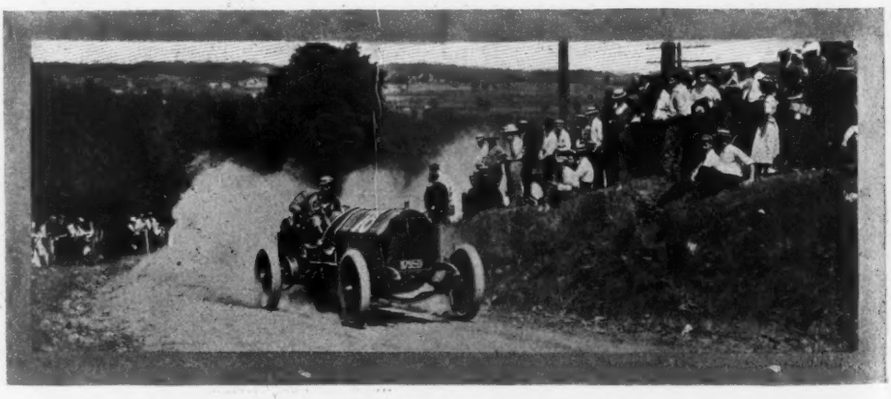
the club marshals did very well indeed, and the whole card was run off without a mishap. The course was kept clear at all times, the delays being caused by drivers attempting to handle too many cars, which caused delays waiting for them to return to the starting line. Only once was there the slightest mishap, that occuring when Shetnitz, an amateur, driving a Chalmers-Detroit, had his steering gear go wrong while climbing Phillips hill in the afternoon. It was near the top and for a moment it looked as if disastrous consequences would result. But the amateur pluckily brought his car to a stop just before the tape was reached and it was pushed off the road before the next car came up.

New Classification Used

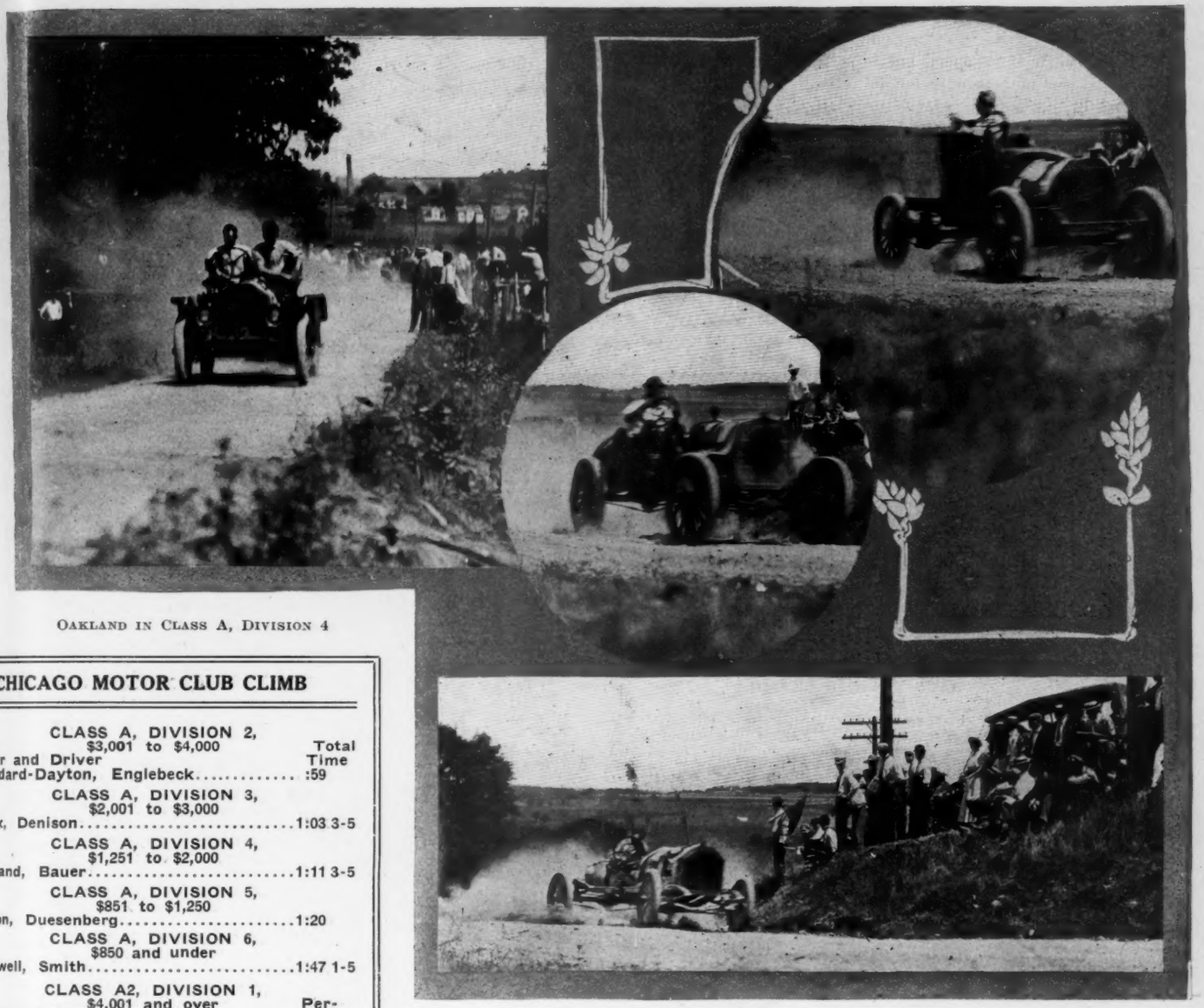
This year's climb differed somewhat from previous ones. The old system of classification by means of piston area was abandoned because it conflicted with the new scheme devised by the Manufacturers' Contest Association and adopted by the American Automobile Association for uniformity's sake. The field was therefore classified by piston displacement and also by price. Time decided the winners in all but class A2, in which the results were reached by means of the club's formula, in which the piston area is multiplied by the time and the result divided by the weight of the car with its load. In addition to the regular A. A. A. card there were added events for motor buggies and electrics, while the amateurs

CLASS WINNERS AT ALGONQUIN

Car and Driver	Total Time
CLASS C, Free-for-all	
Chadwick, Zengel	:50 3-5
CLASS F, DIVISION 1, Not exceeding 390 inches	
Stoddard-Dayton, Miller	:56 2-5
CLASS F, DIVISION 2, Not exceeding 202 inches	
Velie, Stickney	1:09
Mason, Duesenberg	1:09
CLASS B, DIVISION 1, 451 to 600 cubic inches	
Knox, Denison	:55 3-5
CLASS B, DIVISION 2, 301 to 450 cubic inches	
Buick, Burman	:56 3-5
CLASS B, DIVISION 3, 231 to 300 cubic inches	
Corbin, Bird	1:03 4-5
CLASS B, DIVISION 4, 151 to 230 cubic inches	
Velie, Stickney	1:03 4-5
CLASS B, DIVISION 5, 160 cubic inches and under	
Buick, Burman	1:25 3-5
CLASS G, Electrics	
Babcock, Peck	1:21 1-5
CLASS G, Motor Buggies	
Holsman, Renegar	1:54 2-5
CLASS A, DIVISION 1, $4,001 and over	
Thomas, Greiner	1:15 2-5



PERRY HILL CLIMB OF GREINER IN THOMAS, SECOND IN FREE-FOR-ALL



OAKLAND IN CLASS A, DIVISION 4

IN CHICAGO MOTOR CLUB CLIMB

CLASS A, DIVISION 2,
$3,001 to $4,000

Car and Driver	Total Time
Stoddard-Dayton, Englebeck	:59

CLASS A, DIVISION 3,
$2,001 to $3,000

Knox, Denison	1:03 3-5

CLASS A, DIVISION 4,
$1,251 to $2,000

Oakland, Bauer	1:11 3-5

CLASS A, DIVISION 5,
$851 to $1,250

Mason, Duesenberg	1:20

CLASS A, DIVISION 6,
$850 and under

Maxwell, Smith	1:47 1-5

CLASS A2, DIVISION 1,
$4,001 and over

Car and Driver	Percentage
Thomas, Greiner	13.5

CLASS A2, DIVISION 2,
$3,000 to $4,000

Stoddard-Dayton, Englebeck	9.31

CLASS A2, DIVISION 3,
$2,001 to $3,000

Grout, Halbert	8.03

CLASS A2, DIVISION 4,

Kisselkar, Schoeneck	shrdlu un

CLASS A2, DIVISION 5,
$851 to $1,250

Mason, Duesenberg	7.85

CLASS A2, DIVISION 6,
$850 and under

Maxwell, Smith	9.78

UPPER CORNER, DUESENBURG IN MASON; CENTER, BIRD IN CORBIN: BOTTOM ILLUSTRATION, BURMAN IN BUICK

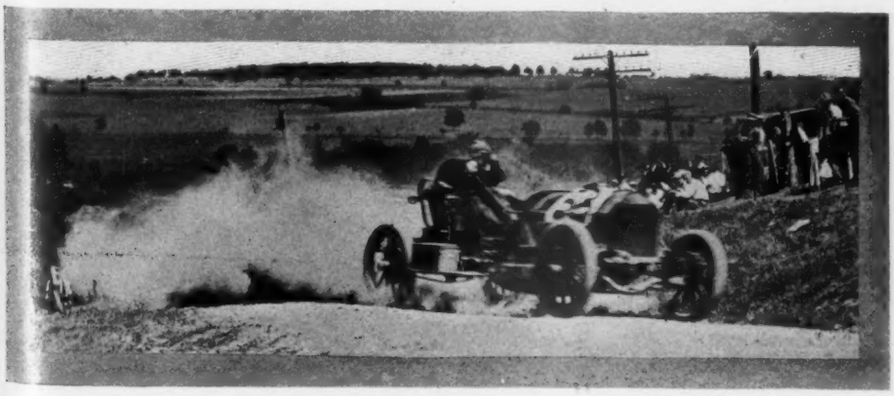
were also cared for. The owners competed with the tradesmen, but their time figured in deciding the amateur championship.

As in previous years two hills were used. In the morning Perry hill, about a quarter of a mile in length, was tackled from a standing start. In the afternoon the contestants went up Phillips hill, half a mile in length, and from a standing start. The time made on both hills was used in deciding the winners.

Hills in Fine Condition

Both grades were in the best of condition, so it was no wonder that record was broken. On Phillips hill the bad bend near the top had been improved by cutting away 5 feet of the bank, so that it was almost like a race course, the grade being so slight as to make it easy for every car to go up on the high. Another improvement was moving the starting line back so that the finish was nearer the brink of the hill.

Father Time suffered most on Perry hill, where four cars beat the old record of :24⅕ and two others tied it. The Chadwick made it in :22⅘, the Thomas six in :24, the big Knox in :23⅖ and the National six in :23⅗. In addition the Stoddard and Buick tied the old figures. On Phillips hill the Chadwick was the only one to get inside of Leland's :29⅖, registering :28, while Greiner in the Thomas



DENISON IN THE KNOX IN ONE OF HIS MANY CLIMBS UP PERRY HILL

tied the record for the short climb.

When the program was first announced everyone looked for a speed battle in the free-for-all, for undoubtedly it was one of the most brilliant fields of the year. In addition to the Chadwick six there were the Thomas and National sixes, the big Knox, two Stoddard-Daytons, two Stearnses, a Locomobile, a Marion and a Chalmers-Detroit Forty. Four of the eleven starters were amateurs—the Thomas, Chalmers, Stearns and Locomobile being driven by their owners. The morning round had given the Chadwick a lead of 1 second over the National six and a battle royal was anticipated in the afternoon. There was a pretty scrap, but it was not made by the National. Greiner unexpectedly proving the factor. Aitken was a disappointment on Phillips hill, for he came over the brow, missing badly and clearly traveling slowly. In fact, as it afterwards turned out, four beat him up Phillips hill and he dropped from second to fourth place. In explanation of the National's climb it was stated that Aitken started up without enough gasoline in his tank.

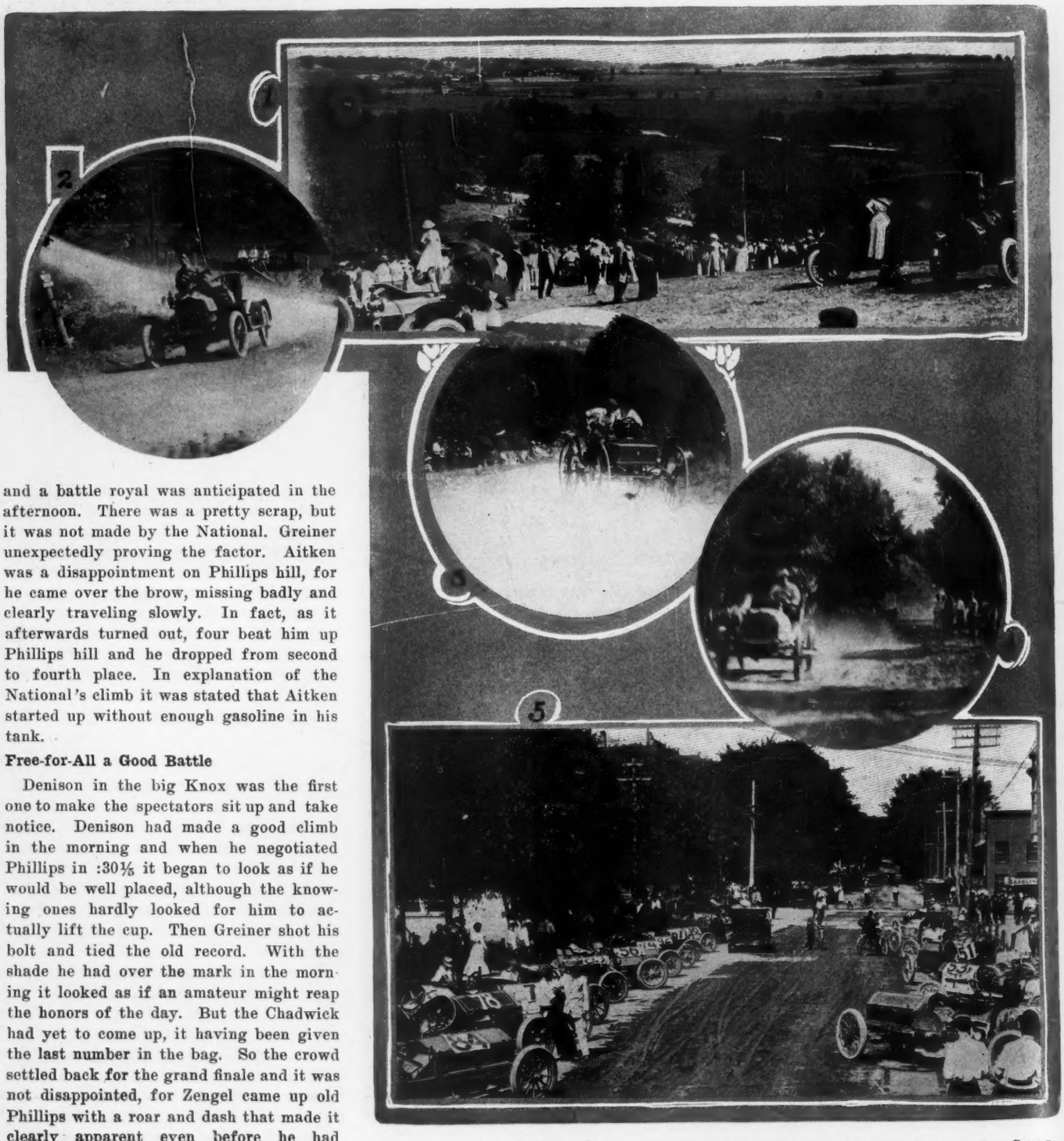
Free-for-All a Good Battle

Denison in the big Knox was the first one to make the spectators sit up and take notice. Denison had made a good climb in the morning and when he negotiated Phillips in :30⅕ it began to look as if he would be well placed, although the knowing ones hardly looked for him to actually lift the cup. Then Greiner shot his bolt and tied the old record. With the shade he had over the mark in the morning it looked as if an amateur might reap the honors of the day. But the Chadwick had yet to come up, it having been given the last number in the bag. So the crowd settled back for the grand finale and it was not disappointed, for Zengel came up old Phillips with a roar and dash that made it clearly apparent even before he had crossed the tape that the cup was his. And so it proved, for he had done :28, lowering the record 1⅖ seconds, making his time :50⅘ as against :53⅖ for Greiner. The big Knox was placed third, the National fourth, the two Stoddards fifth and sixth, the two Stearnses seventh and eighth, the Locomobile ninth and the Marion tenth.

The Little Free-for-All

Class F, division 1, limited to cars with displacement not exceeding 390 cubic inches, was styled the little free-for-all, and proved to be a classy event which attracted the Stoddard-Dayton, Buick, Knox, National, Corbin, Marion and Kissel-kar, some of them having in two cars. The Stoddard driven by Bert Miller had the speed of the party, though, getting first place by ⅕ second over the Buick driven by Burman, the total times of the two leaders—:56⅖ and 56⅗, respectively.

The Knox drew first blood in division 1 of class B, for cars from 451 to 600 cubic inches of piston displacement. It was the big Knox and Denison drove. Its time was :53⅗, just ⅕ second slower than made by Greiner in the big free-for-all and 1 second faster than it could make itself in the speed battle. Englebeck was Burman in the Buick was the top-liner



1—General View From Perry Hill. 2—The Little Maxwell. 3—Holsman in Its Climb. 4—The Babcock Electric. 5—The Noon Control in Algonquin

in division 2 of this class, which was for the 301-450 bunch. In this Burman beat Miller in the Stoddard-Dayton, who, however, evened up the score in the little free-for-all, where the positions were reversed. Denison in the little Knox was third, but 2⅖ seconds slow. The Corbin won in the third division, the 231-300 lot.

In division 4, from 161 to 230 cubic inches, the Velie, Chalmers-Detroit, Mason and Moline battled, and it was the Velie, a newcomer in the competition game in these parts, that won handily, beating the Chalmers driven by Knipper, 1:03⅘ to 1:06⅕. A surprising climb was made by the two-cylinder Mason, which was only ⅗ second slower than the Chalmers. Earlier in the day the Mason had given indications of its speed when it tied the Velie in division 2 of class F, for cars not exceeding 202 cubic inches piston displacement. In this each did 1:09, but the Velie improved on this in the event which it won. The little Buick driven by Burman had a big shade in division 5 of class B.

The motor buggy division originally had five entries, but the two McIntyres never showed up, and so two Holsmans and a Schacht fought it out, with the Holsmans running one, two. The electric division also was handicaped by the loss of one of its three entrants, the Detroit, but the Babcock and the Columbus opened the eyes of many by the speed which they displayed. The Babcock won.

There were six divisions in class A in which the clasification was made by price. In conjunction with this were run the formula events of class A 2, one climb sufficing for both. In division 1 Greiner in the Thomas six had a walkover. In division 2 just the two Stoddards ran, Engelbeck winning in :59 and Miller being second in 1:00⅕. The Knox had 5 seconds the advantage over the Kisselkar in division 3, with the Grout third. In division 4 seven cars started and the Oakland driven by Howard Bauer, of Buffalo, trimmed the Velie by 4⅘ seconds.

The two-cylinder Mason was the winner in division 5 of class A, its victims being the Maxwell and Buick. In this event there was a difference between first and second of 13⅕ seconds. The card was opened by a duel between the little Hupmobile and the Maxwell Junior in which the latter put it over its rival from Detroit.

1—Timing Stand on Phillips Hill. 2—Technical Committeeman Edwards. 3—The Algonquin Cup. 4—Chief Timer Trego. 5—Timers on Perry Hill

Running Under the Formula

One of the closely-watched phases of the hill-climb was the running of six divisions under the club formula in which the winner is not the car making the fastest time up the hill but is determined by multiplying the piston displacement of the car in cubic inches by the length of time in seconds required to climb the hill and dividing the result by the weight of the car with driver in pounds, the lowest percentage being the winner. This formula is designed to test motor efficiency and of the fifteen cars that ran under it the two-cylinder Mason No. 5 made the best showing with a percentage of 7.85. A close second was No. 10 Kisselkar with a standing of 7.86.

In division No. 6 the small four-cylinder Maxwell was a victor over the Hupmobile, its percentage being 9.78. In division 5 the Mason had the advantage over the Maxwell with the low-water mark of 7.85. Division 4 offered the biggest field in this classification and here the Kisselkar was

victor with 7.86 percentage. The Velie made the best showing, but was disqualified for not carrying a muffler. Grout No. 17 was a winner with a good margin in division 3, although not the fastest car in this class. In division 2 Englebeck with No. 19 Stoddard-Dayton had a little advantage over his team mate, Miller, in time and also in percentage, his figure being 9.31. In division 1 Greiner with his six-cylinder Thomas had no competitor.

Four amateurs competed for owners' honors, the best time being made by Greiner in the Thomas.

Gear Work On Hills

One feature of the Algonquin hill-climb, which is not generally appreciated by the laity, is the relation of the nature of the two hills to the mechanical construction of the competing cars. In all hill-climbing contests much of the success of a car depends first upon the efficiency of its gear ratios and their adaptability to the grades encountered; second, upon the skill and judgment of the driver, in changing from one gear to another, and his ability to maintain the maximum power of efficiency of the motor. At Algonquin there are two hills. One is short and steep, with two turns, the first being a right-angled turn to the right, 50 yards from the start; the second less sharp and to the left 40 yards from the finish; the other is long and shaped like a hockey stick with a gentle approach and one turn to the left near the top. The first is Perry hill, which is climbed from a standing start in the forenoon. The hill is 1,146 feet long, with an average grade of 9⅕ per cent and a maximum of 12⅕ per cent about midway between the two turns. The Phillips hill, climbed in the afternoon, measures 2,592 feet and has an average gradient of 5¼ per cent, which reaches a maximum of 9 per cent just before and at the turn. Perry hill defies high-gear work for almost all cars having more than two speeds, for the run to the first turn is so short that even the big cars cannot show more than 30 miles at the turn. After the bend comes a straight run to another turn near the top of the stiff grade.

In the afternoon contest the entire ascent of Phillips hill was generally made entirely on the high gear. Only a few of the cars were able to negotiate the steep incline of Perry hill in the morning on the high gear. The undisputed champion of the day, the Chadwick six, piloted by Zengel, was geared to 7 to 1 on low, 3 9-10 to 1 on second, 2 6-10 to 1 on third and 1 9-10 to 1 on high. In the morning contest this car started on second speed and got away rather slowly; at the 3-yard line, however, the third-speed gear was thrown into mesh and the car bounded forward vigorously, hitting the turn at a terrific pace and causing it to skid almost into the ditch. The high-speed gear was used from start to finish on Phillips hill in the afternoon.

Work of Other Cars

The Stoddard-Dayton which won in division 1 of class F got a good start, changed to the second-speed gear at about 5 yards, then picked up steadily with fair acceleration. In the second division of class F, the Velie was the winner, and getting away with a fairly good start changed into intermediate at 5 yards and climbed rapidly. The winning Knox in division 1 of class B started quickly, changed gears on the 5-yard line, picked up very fast and skidded badly after rounding the first turn. The Buick, which won in division 2 of class B, made the entire ascent on second speed. Its start was good and acceleration rapid and the car skidded badly on the turn.

With a start that was only fairly good, the Corbin got away on second, changed to the high at about 5 yards from the starting line and made the ascent with increasing rapidity, making the best time in division 3 of class B. Division 4 of class B was won by a Velie which also made the ascent on the high gear. The start, which was fairly good, was made on the second high gear being thrown into mesh in about 5 yards.

The fifth division of class B went to a Buick with two forward speeds. The start was poor, however, in the forenoon trial, and the acceleration rather slow, owing to the fact that the entire ascent was made on high. The victor in the motor buggy division was a Holsman with a friction-chain transmission and two forward speeds. The high-speed chains were used from start to finish on both hills, and although the get-away was a bit slow it climbed steadily. The electrics, which are generally equipped with a gear ratio of about 4 to 1, were considerably reduced for the occasion and made a creditable showing.

Of the two Stoddard-Daytons entered in division 2 of classes A and A2, the winning car got a fairly good start on first speed, changed to second at 10 yards and made the ascent briskly. The Knox, which won in division 3, got a very successful start on first speed and shifting to second on the 10-yard line made a most senastional ascent. Division 4 went to an Oakland, which displayed plenty of power but left on first and shifted to second on the 5-yard line.

The power displayed by the two-cylinder Mason, which won in division 5 of classes A and A2, was a-plenty. It got away with a fair start on low and picked up rapidly. In division 6 the little Maxwell, which won, got away quickly and shifted to high at about 25 yards from the start, the high gear, as on all winning cars, being used throughout on Phillips hill.

RESULTS OF THE FORMULA EVENTS IN CLASS A 2

CLASS A 2, DIVISION 1

No.	Car.	A. M. Pct.	P. M. Pct.	Tota Pct
21—	Thomas	5.9	7.6	13.5

CLASS A 2, DIVISION 2

19—	Stoddard-Dayton	4.04	5.27	9.31
20—	Stoddard-Dayton	4.08	5.44	9.52

CLASS A 2, DIVISION 3

17—	Grout	3.38	4.65	8.03
15—	Knox	3.4	5.4	8.44
18—	Kisselkar	4.3	5.75	10.06

CLASS A 2, DIVISION 4

No.	Car.	A. M. Pct.	P. M. Pct.	Total Pct.
10—	Kisselkar	3.24	4.52	7.86
9—	Oakland	3.95	4.45	8.4
7—	Petrel	3.91	4.58	8.49
6—	Oakland	4.51	5.08	9.59

CLASS A 2, DIVISION 5

5—	Mason	3.80	4.05	7.85
4—	Maxwell	3.6	5.76	9.36

CLASS A 2, DIVISION 6

1—	Maxwell	3.89	5.89	9.78
2—	Hupmobile	3.86	6.22	10.08

RELATIVE STANDING FROM TIME STANDPOINT

Position	Number and Car	A. M.	P. M.	Total Time
1—85.	Chadwick	:22⅗	:28	:50⅗
2—78.	Thomas	:24	:29⅖	:53⅖
3—58.	Knox	:23⅖	:30⅕	:53⅗
4—83.	Knox	:24⅖	:30⅕	:54⅗
5—84.	National	:23⅗	:32	:55⅗
6—57.	Stoddard-Dayton	:24⅗	:31⅕	:55⅘
7—59.	Stoddard-Dayton	:24⅗	:31⅗	:56⅕
8—80.	Stoddard-Dayton	:24⅗	:31⅗	:56⅕
9—64.	Stoddard-Dayton	:24⅕	:32⅕	:56⅖
10—53.	Buick	:24⅕	:32⅖	:56⅗
11—72.	Buick	:24⅖	:32⅕	:56⅗
12—82.	Stoddard-Dayton	:25	:32	:57
13—68.	Knox	:25⅖	:33	:58⅖
14—49.	Stoddard-Dayton	:25⅗	:33	:58⅗
15—19.	Stoddard-Dayton	:25⅗	:33⅖	:59
16—47.	Knox	:25⅘	:33⅕	:59
17—50.	National	:26⅕	:33⅕	:59⅖
18—20.	Stoddard-Dayton	:25⅘	:34⅖	1:00⅕
19—70.	National	:26⅘	:33⅖	1:00⅕
20—54.	Stearns	:27	:35	1:02
21—74.	Stearns	:26⅗	:35⅗	1:02⅕
22—77.	Stearns	:25⅖	:37⅖	1:02⅘
23—15.	Knox	:24⅗	:39	1:03⅗
24—67.	Corbin	:28⅖	:35⅕	1:03⅗
25—34.	Velie	:27⅕	:36⅗	1:03⅘
26—40.	Corbin	:28⅕	:35⅗	1:03⅘
27—42.	Moon	:27⅖	:37	1:04⅖
28—56.	Stearns	:27⅖	:38	1:05⅖
29—71.	Marion	:28⅕	:37⅗	1:05⅘
30—36.	Chalmers-Detroit	:30⅕	:36	1:06⅕
31—37.	Mason	:28⅖	:38⅖	1:06⅘
32—73.	Kisselkar	:29	:38⅕	1:07⅕
33—63.	Buick	:30⅖	:37	1:07⅖
34—41.	Falcar	:30⅕	:38⅖	1:08⅗
35—18.	Kisselkar	:29⅖	:39⅕	1:08⅗
36—60.	Velie	:25⅕	:43⅘	1:09
37—61.	Mason	:30⅘	:38⅕	1:09
38—43.	Columbia	:29⅖	:40⅗	1:10
39—51.	Kisselkar	:29	:41	1:10
40—75.	Locomobile	:30⅘	:39⅗	1:10⅖
41—55.	Locomobile	:31	:40	1:11
42—81.	Marion	:31⅖	:39⅗	1:11
43— 9.	Oakland	:31⅘	:39⅘	1:11⅗
44— 5.	Mason	:38⅘	:41⅕	1:20
45—44.	Marion	:33⅕	:40⅘	1:14
46—48.	Moline	:30⅘	:44	1:14⅘
47—21.	Thomas	:33	:42⅖	1:15⅖
48—17.	Grout	:32⅕	:44⅘	1:17
49— 6.	Oakland	:36⅗	:41⅕	1:17⅘
50—24.	Babcock	:34⅕	:47	1:21⅕
51—10.	Kisselkar	:34⅕	:47⅗	1:21⅘
52— 7.	Petrel	:34	:50	1:24
53—30.	Buick	:38	:47⅗	1:25⅗
54—45.	Buick	:43⅖	:45⅗	1:29
55— 4.	Maxwell	:36⅕	:57	1:33⅕
56—22.	Columbus	:36⅖	:59⅕	1:35⅗
57—11.	Marion	:45⅕	:50⅘	1:36
58— 1.	Maxwell	:42⅗	1:04⅗	1:47⅕
59—28.	Holsman	:42	1:12⅖	1:54⅖
60— 2.	Hupmobile	:46⅗	1:15	2:01⅗
61—25.	Holsman	:47	1:19⅘	2:06⅘
62—32.	Monitor	:54⅘	1:15⅖	2:10⅕
63—31.	Maxwell	1:01⅗	1:22	2:23⅗
64—27.	Schacht	:59	1:33⅗	2:32⅗

DRIVING GEAR RATIOS OF CLASS WINNERS

No.	Car	Gear Ratio on Direct Drive		
85—	Chadwick six	1	9-10	to 1
64—	Stoddard-Dayton	2	9-10	to 1
60—	Velie	4		to 1
58—	Knox			
53—	Buick	3	1-2	to 1
40—	Corbin	3	3-4	to 1
34—	Velie	4		to 1
30—	Buick	3	1-2	to 1
24—	Babcock	9	4-10	to 1
25—	Holsman	5		to 1
21—	Thomas	1	11-16	to 1
19—	Stoddard-Dayton	2	9-10	to 1
15—	Knox	3		to 1
9—	Oakland	3		to 1
5—	Mason	3	5-12	to 1
1—	Maxwell	4		to 1

RESULTS OF THE CHICAGO MOTOR CLUB'S ANNUAL HILL-CLIMB AT ALGONQUIN

CLASS C, FREE-FOR-ALL

No.	Car	Bore & Stroke	Wt. Car	Tires	Magneto	Carbureter	Driver	A. M. Time	P. M. Time	Total Time
85	Chadwick Six	5x6	2790	Michelin	Bosch	Chadwick	L. J. Zengel	:22⅜	:28	:50⅜
78	Thomas Six	5½x5½	3420	Michelin	Bosch		A. W. Greiner	:24	:29⅝	:53⅝
83	Knox	5½x5½	2530	Fisk	Bosch	Stromberg	A. Denison	:24⅜	:30⅛	:54⅜
84	National Six	5x5		Michelin	Bosch	Schebler	J. Aitken	:23⅜	:32	:55⅜
80	Stoddard-Dayton	5¼x5¾	2994	Michelin	Bosch	Stromberg	B. Miller	:24⅜	:31⅝	:56⅛
82	Stoddard-Dayton	5¼x5¾	2994	Michelin	Bosch	Stromberg	C. Englebeck	:25	:32	:57
74	†Stearns	5⅜x5⅞	3230	Fisk	Bosch	Stearns	H. Beaumont	:26⅜	:35⅝	1:02⅛
77	Stearns	5⅜x5⅞	3265	Fisk	Bosch	Stearns	*B. Howard	:25⅞	:37⅜	1:02⅛
75	Locomobile	5x6	2770	Continental	Locomobile	Locomobile	*H. N. Scott	:30⅛	:39⅜	1:10⅜
81	Marion	4¼x4½	1920	Michelin	Splitdorf	Schebler	A. Monsen	:31⅜	:39⅜	1:11
76	Chalmers-Detroit	5x4¾	2470	Diamond	Bosch	Mayer	*D. Schetnitz	:32	DID NOT	FINISH

CLASS F, DIVISION 1, DISPLACEMENT NOT EXCEEDING 390 CUBIC INCHES

64	Stoddard-Dayton	4¾x5		Goodrich	Bosch	Stromberg	B. Miller	:24⅛	:32⅛	:56⅜
72	Buick	4½x5	2155	Michelin	Remy	Schebler	R. Burman	:24⅜	:32⅛	:56⅜
68	Knox	5x4¾	2550	Fisk	Bosch	Stromberg	A. Denison	:25⅜	:33	:58⅜
70	National	4¾x4¾	2140	Diamond and Michelin	Bosch	Schebler	J. Kincaid	:26⅛	:33⅜	1:00⅛
67	Corbin	4½x4½	2070	Michelin and Firestone	Bosch	Schebler	W. G. Bird	:28⅜	:35⅜	1:03⅜
71	Marion	4¼x4½	2098	Michelin	Splitdorf	Schebler	A. Monsen	:28⅛	:37⅜	1:05⅛
73	Kisselkar	4⅞x4¾	2415	Goodyear	Remy	Stromberg	G. Schoeneck	:29	:38⅛	1:07⅛
63	Buick	4½x5	2155	Michelin	Remy	Stromberg	*A. Greiner	:30⅜	:36	1:07⅜
65	Marion	4¼x4½	1840	G & J	Splitdorf	Schebler	H. Stutz	DID NOT	START	:39⅛

CLASS B, DIVISION 1, DISPLACEMENT 451 TO 600 CUBIC INCHES; MINIMUM WEIGHT 2400 POUNDS

58	Knox	5½x5½	2530	Fisk	Bosch	Stromberg	A. Denison	:23⅜	:30⅛	:53⅜
57	Stoddard-Dayton	5¼x5¾	2575	Michelin	Bosch	Stromberg	C. Englebeck	:24⅜	:31⅛	:55⅛
59	Stoddard-Dayton	5¼x5¾	2645	Michelin	Bosch	Stromberg	B. Miller	:24⅜	:31⅜	:56⅛
54	†Stearns	5⅜x5⅞	3230	Fisk	Bosch	Stearns	H. Beaumont	:27	:35	1:02
56	Stearns	5⅜x5⅞	3265	Fisk	Bosch	Stearns	*B. Howard	:87⅞	:38	1:05⅜
55	Locomobile	5x6	2770	Continental	Locomobile	Locomobile	*H. Scott	:31	:40	1:11

CLASS B, DIVISION 2; DISPLACEMENT 301 TO 450 CUBIC INCHES. MINIMUM WEIGHT 2100 POUNDS

53	Buick	4½x5	2155	Michelin	Remy	Schebler	R. Burman	:24⅛	:32⅜	:56⅜
49	Stoddard-Dayton	4¾x5	2285	Goodrich	Bosch	Stromberg	B. Miller	:25⅜	:33	:58⅜
47	Knox	5x4¾	2550	Fisk	Bosch	Stromberg	A. Denison	:25⅜	:33⅛	:59
50	National	4¾x4¾	2140	Diamond and Michelin	Bosch	Schebler	J. Kincaid	:26⅛	:33⅛	:59⅜
51	Kisselkar	4⅞x4¾	2415	Goodyear	Remy	Stromberg	G. Schoeneck	:29	:41	1:10
48	Moline	4½x5	2060	Goodrich	Splitdorf	Schebler	O. E. Thorne	:30⅜	:44	1:14⅜

CLASS B, DIVISION 3; DISPLACEMENT 231 TO 300 CUBIC INCHES. MINIMUM WEIGHT 1800 POUNDS

40	Corbin	4½x4¼	2070	Michelin and Firestone	Bosch	Schebler	W. G. Bird	:28⅛	:35⅜	1:03⅜
42	Moon	4⅛x4½	2170	Diamond	Bosch	Stromberg	P. Wells	:27⅜	:37	1:04⅜
41	Falcar	4¼x4½	1930	Goodyear and Goodrich	Remy	Kalamazoo	W. H. Pearce	:30⅛	:38⅜	1:08⅜
43	Columbia	4¼x4½	2175	Hartford	Columbia	Columbia	W. Lolley	:29⅜	:40⅜	1:10
44	Marion	4¼x4½	1920	Michelin	Splitdorf	Schebler	A. Monsen	:33⅛	:40⅜	1:14
45	Buick	4⅜x5	2195	Michelin	Remy	Schebler	R. Burman	:43⅜	:45⅜	1:29
39	Marion	4¼x4½	1840	G & J	Splitdorf	Schebler	C. E. Stutz	DID NOT	START	:36⅜

CLASS B, DIVISION 4, DISPLACEMENT 161 TO 230 CUBIC INCHES. MINIMUM WEIGHT 1500 POUNDS

34	Velie	4x4	1685	Fisk	Splitdorf	Kingston	J. Stickney	:27⅕	:36⅜	1:03⅜
36	Chalmers-Detroit	4x4½	1805	Diamond	Bosch	Kingston	W. Knipper	:30⅝	:36	1:06⅝
37	Mason	5x5	1650	Diamond	Splitdorf	Schebler	F. Duesenberg	:28⅜	:38⅜	1:06
33	Moline	4x4½	1790	Goodrich	Simms-B'sch	Schebler	F. Salisbury	:28⅜		

CLASS B, DIVISION 5; DISPLACERENT 160 CUBIC INCHES AND UNDER. MINIMUM WEIGHT 1200 POUNDS

30	Buick	3⅜x3⅝	1490	Michelin	Remy	Stromberg	R. Burman	:38	:47⅜	1:25⅜
32	Monitor	5x4	1440	Hartford	None	Schebler	W. Rabenold	:54⅛	1:15⅜	2:10⅛
31	Maxwell	4x4	1225	Ajax	Splitdorf	Maxwell	T. Marshall	1:01⅜	1:22	2:23⅜

CLASS G, MOTOR BUGGIES

28	Holsman	5⅛x2½	1290	Diamond	None	Breeze	J. Renegar	:42	1:12⅜	1:54⅜
25	Holsman	5⅛x2½	1110	Diamond	None	Breeze	J. Renegar	:47	1:19⅛	2:06⅛
27	Schacht	4¾x4	1410	Goodrich	None	Schebler	J. Behrle	:59	1:33⅜	2:32⅜

CLASS G, ELECTRICS

24	Babcock		2250	Goodyear	None	None	F. G. Peck	:34⅛	:47	1:21⅛
22	Columbus		1740	Palmer-Webb	None	None	R. S. Fend	:36⅜	:59⅛	1:35⅜

CLASS F, DIVISION 2; DISPLACEMENT NOT EXCEEDING 202 CUBIC INCHES

60	Velie	4x4	1685	Fisk	Splitdorf	Kingston	J. Stickney	:25⅛	:43⅜	1:09
61	Mason	5x5	1650	Diamond	Splitdorf	Schebler	F. Duesenberg	:30⅛	:38⅛	1:09

CLASS A, DIVISION 1, $4,000 AND OVER

21	Thomas six	5½x5½	4154	Michelin	Bosch	Mayer	A. W. Greiner	:33	:42⅞	1:15⅜

CLASS A, DIVISION 2, $3001 TO $4,000

19	Stoddard-Dayton	5¼x5¾	2994	Michelin	Bosch	Stromberg	C. Englebeck	:25⅜	:33⅜	:59
20	Stoddard-Dayton	5¼x5¾	2994	Michelin	Bosch	Stromberg	B. Miller	:25⅜	:34⅜	1:00⅛

CLASS A, DIVISION 3, $2,001 To $3,000

15	Knox	5x4¾	2550	Fisk	Bosch	Stromberg	A. Denison	:24⅜	:39	1:03⅜
18	Kisselkar	4¾x4¾	3300	Goodyear	Remy	Stromberg	G. Schoeneck	:29⅜	:39⅛	1:08⅜
17	Grout	4½x5	2870	Diamond-Firestone	Remy	Stromberg	H. E. Halbert	:32⅛	:44⅜	1:17

CLASS A, DIVISION 4, $1251 TO $2,000

9	Oakland	4½x5	2450	Goodyear	Splitdorf	Oakland	H. Bauer	:31⅛	:39⅛	1:11⅜
8	†Velie	4x4	2110	Fisk	Splitdorf	Kingston	J. Stickney	:36	:40⅜	1:16⅜
6	Oakland	4½x5⅜	2125	Goodyear	Splitdorf	Oakland	A. G. Harding	:36⅜	:41½	1:17⅜
10	Kisselkar	4¼x4¼	2400	Goodyear	Remy	Stromberg	G. Schoeneck	:34⅛	:47⅜	1:21⅛
7	Petrel	4⅜x4¾	2260	Michelin	U & H	Stromberg	F. Schwader	:34	:50	1:24
11	Marion	4¼x4½	2350	Michelin	Splitdorf	Schebler	A. Monsen	:45⅛	:50⅛	1:36
14	Buick	4½x5	2684	Michelin	Remy	Stromberg	*A. Greiner		:37⅛	

CLASS A, DIVISION 5, $851 TO $1,250

5	Mason	5x5	1840	Diamond	Splitdorf	Schebler	F. Duesenberg	:38⅛	:41⅛	1:20
4	Maxwell	3¾x4	1610	Ajax		Maxwell	J. Illingsworth	:36⅝	:57	1:33⅛

CLASS A, DIVISION 6, $850 AND UNDER

1	Maxwell	3¾x4⅜	1760	Ajax	None	Maxwell	E. J. Smith	:42⅜	1:04⅜	1:47⅛
2	Hupmobile	3¼x3⅜	1220	G & J	Bosch	Breeze	E. A. Hearne	:46⅜	1:15⅜	2:01⅜

*Amateur †Disqualified

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Wrestling With the Motor Car Contest Dilemma

THE most welcome news in the motor car contest arena is contained in the latest bulletin, issued by the Manufacturers' Contest Association and published in detail on other pages in this issue, which announces that during the opening of the Indianapolis motor speedway this association will draft complete rules for the 1910 contests and wrestle with many other problems—thirteen in all—which are directly concerned with motor contests. If this program is carried into effect, and there is every reason to believe several very important steps will be taken, the Manufacturers' Contest Association will cover itself with glory, for it will be the first time that this matter has ever been taken up comprehensively and at a time sufficiently far in advance of the opening of the contest season so that all 1910 contests can be run under a uniform set of rules.

ONE of the most important phases of the 1910 rules will be the classification of cars for contests, whether this classification is by weight, by price, or by piston displacement. With the present well-perfected condition of the motor car industry, it is quite absurd to classify by weight. Before the era of alloy steels, and when manufacturers considered increasing the bore of a motor the only means of attaining greater car efficiency, weight was one of the selling considerations, and it was one sphere in which one make of car gained greatly over another. Today, however, the variations in weight are so vast as to make it utterly impossible to classify on this basis with any degree of justice to all manufacturers.

THE price classification is an extremely difficult one at the present time and practically as impossible as the weight classification. This is due to the great variance in factory methods. One concern manufacturing 10,000 to 12,000 cars, can afford to sell its product at a much lower price than a concern building a similar car in quantities of 800 or 1,000. And as it is understood contests are to test cars irrespective of the quantities in which they are manufactured, this practically precludes the price classification. The price classification has had its strongest advocate in the dealers, but in 1910 the dealers' entry will not be comparable with the factory entry because if "coming events cast their shadows before" it is now a foregone conclusion that the real contests of next year will be supported by the manufacturers direct.

ONE of the points which the Manufacturers' Contest Association has announced for its program of discussion next week is the dividing of the country into territories and the conducting of one contest in each territory, as well as the announcing of these dates during the present season, and the prohibiting of sanctioning other events to interfere with these dates. Motor Age has advocated this policy for 1 year. Announcement has been made that four contests of this nature would suffice, but this will not be enough. There should be, at least, six or seven. This country is too big for four. California must have its contest; Denver is the center of a vast distributing territory; Kansas City will soon take third place as a distributing center; Minneapolis controls four or five great motor car buying states; Chicago is the first retailing distributing center in the country; New England must be attended to; and the South is deserving of attention. In fact, it looks as though there would have to be eight contests of this importance. The vastly varying climatic conditions in California, Denver, Kansas City and the South, are such that but four of the contests would come within the season ordinarily given over to contests between New England and the Mississippi, and as far south as the Dixie line. The Manufacturers' Contest Association will have to carefully survey the field, because these contests are for 125 manufacturers of American cars and it must be remembered that, whereas some of them have selling agencies in but twenty states, others are disposing of cars in practically every state of the Union.

ONE of the greatest questions this organization will have to deal with is the 1-mile and ¾-mile track races. The mile track performance is an appetizing one to motor clubs at the present time, in that it offers fruitful field for remuneration. There is no money to the promoter of endurance contests or hill-climbs; in fact, few of the clubs promoting these have made expenses during the last year. This is not so with the track event, and it is because of this remuneration that so many hippodrome performances have occurred during the present season; not a few track events, while apparently promoted by legitimate clubs, have been the work of others with racing cars who have worked under the cloak of clubdom. The dangers of racing on the mile track are as great today as 2 years ago, and with the completion of one speedway and the probability of one or two more in the next year or so, there is no reason why sanctions should be granted except for small cars.

UNDOUBTEDLY the road race will come in for its share of attention at the hands of the manufacturers. Road racing over 20 or 30-mile circuits of country roads is to expensive to promoters to be continued. In order to secure adequate speed performances road surfaces have to be treated at great expense; but the greatest expense will come from the proper guarding by state or federal troops. Road racing has proven too expensive in Europe where good roads abound and in America where miles of road have to be constructed it will prove doubly expensive. There is a picturesque phase of road racing which can never be attained on the mile track or speedway, but with the manufacturer and also the promoter racing is a business proposition.

AN evil which has followed the majority of contests during the last year or so is the misleading advertising of manufacturers who have not been the winners but have made creditable performances. This trouble has been paramount from east to west and has done much to discourage the entry of concerns who would not stoop to such tactics. There should be a clearly defined rule on this matter and any violation thereof should result in disqualification, not only of the entrant but of the manufacturer, in case the entrant is the manufacturer's representative.

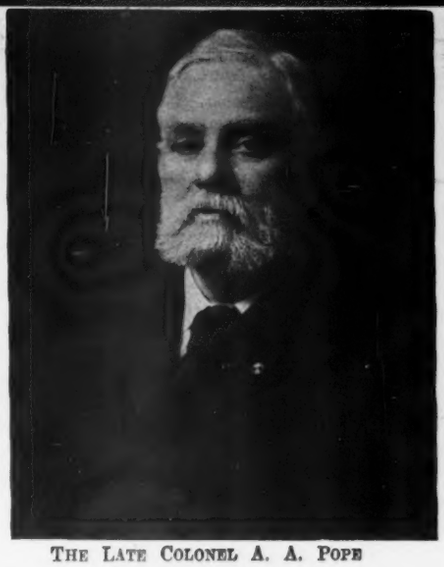
LAST but not least comes a better definition of stock car and stock chassis. The present definition is impossible, in that it is entirely beyond the capabilities of any committee to determine if the car is stock according to it. The fact that a manufacturer makes ten, twenty-five or fifty of one model, in order that it may be considered stock, must be eliminated; because to one manufacturer fifty is a day's output, whereas, to another this would constitute the efforts of 2 months of the entire factory force. If the number of cars manufactured is to be a factor in determining stock cars, then it should be a percentage of the whole output and not an arbitrary number.

DEATH CLAIMS COLONEL POPE, A PIONEER

BOSTON, MASS., Aug. 10—Death today claimed Colonel Albert A. Pope, pioneer bicycle manufacturer and always a prominent light in the motor car manufacturing world, who expired at his summer home in Cohasset after having been in ill health for several months, due to a breakdown in his nervous system which followed the recent financial embarrassment of the several concerns in which he was interested.

Colonel Pope was a self-made man and always a prominent factor in cycling and in motoring. He was born in Boston, May 20, 1843, and received his early education in the public schools of Brookline. His father met financial reverses and the lad went to work for a Brookline farmer. At the age of 15 he went to work in the Quincy market and 3 years afterward, when the rebellion started, he enlisted in the Thirty-fifth Massachusetts infantry. He rose rapidly from the ranks, and when the regiment was mustered out he was brevetted lieutenant-colonel for gallant conduct at the battle of Fredericksburg, Knoxville, Poplar Springs Church and Petersburg. On his return from the war he engaged in making shoe manufacturers' supplies. When, in 1876, the first imported bicycles came into this country, Colonel Pope foresaw an opportunity of building a great fortune by the manufacture in the United States. He founded the Pope Mfg. Co., making Columbia bicycles, and became a millionaire through the medium of the bicycle. Although Colonel Pope was much in the public eye, he never aspired for public office. He was, however, named several times as a possible candidate for elective positions. He was a director for many years in a number of banks and corporations. He was a member of the Loyal Legion Society, of the Society of the Cincinnati, and many other organizations. He was a visitor on the boards of Wellesley college, Lawrence Scientific school, and Harvard.

His connection with the motor industry can be traced through the Pope-Toledo, the Pope-Hartford, Pope-Waverley, Pope-Tribune and the Pope-Robinson. Of these the Pope-Robinson and Pope-Tribune no longer are on the market; the Pope-Waverley is now the Waverley electric and made by a separate concern and the Pope-Toledo plant also has passed into other hands. Of all those in which Colonel Pope formerly was interested there remains only the Pope-Hartford which only recently came out of the receivers' hands. The Pope Motor Car Co. was the colonel's first venture in the manufacture of gasoline cars, the first car being turned out of the Toledo plant in 1901, the company being capitalized at



THE LATE COLONEL A. A. POPE

$2,500,000. Now, however, the big plant is owned by the Overland people, who purchased it this summer. Previous to that, the Pope Motor Car Co. was turning out Pope-Waverley electrics at the plant in Indianapolis, the first machine being marketed in 1898. In 1902 the Pope Mfg. Co. at the plant in Hartford, Conn., marketed the Pope-Hartford. The Pope-Tribune was made at the plant at Hagerstown, Md.

Financial difficulties overtook the Pope interests in 1908 and both the Pope Mfg. Co. and the Pope Motor Car Co. went into the hands of receivers and it was not until this year that the affairs were straightened out, the receivers for the Pope-Hartford interests only being discharged within the last week. The financial storms, however, brought about a disruption of the Pope interests. The Pope-Toledo plant, as mentioned before, was bought by the Overland company, while H. H. Rice and others established the Waverley Co., buying the Indianapolis plant and continuing the manufacture of the Waverley electric. The Pope Hartford concern now has got on its feet and will continue the manufacture of that car, already having out its models.

Coming Motor Events

OPENING OF MOTOR SPEEDWAY—Three-day meet at Indianapolis, August 19, 20, 21.

BRIGHTON BEACH MEET—Twenty-four-hour race of Motor Racing Association, August 26-27.

TRIBUNE TROPHY RUN—Annual reliability of Minneapolis Automobile Club, August 24-25.

"LITTLE GLIDDEN" TOUR—Tour of Minnesota Automobile Association, August 26-28.

NATIONAL STOCK CHASSIS MEET—Motor carnival, including national stock chassis road race, at Lowell, Mass., September 6-11.

BALTIMORE 24—Motor Car Racing Association of Maryland meet at Baltimore, September 10-11.

FLAG-TO-FLAG RUN—Start of Denver-City of Mexico endurance run, September 15.

LONG ISLAND DERBY—Motor Contest Association meet at Riverhead, L. I., September 21.

ROSY OUTLOOK AT INDIANAPOLIS

Indianapolis, Ind., Aug. 9—Progress on the new motor speedway is being made and it was announced today that cars would be allowed to practice on it by Wednesday. There is every indication that the opening meet, scheduled for August 19, 20 and 21, will be the greatest track event in the history of motor racing in the United States. Entries galore are pouring in and the participation of such flyers as the Chadwick six, Benz and Fiat is assured. In addition there are entered ten Stoddard-Daytons, two Appersons, six Nationals, a Lozier, three Marmons, three Marions, two Velies and a Christie. The card is as follows:

THURSDAY, AUGUST 19

Event No. 1—5 miles, stripped chassis cars, class 4, 161 to 230 cubic inches.

Event No. 2—10 miles, stripped chassis cars, class 3, 231 to 300 inches.

Event No. 3—5 miles, stripped chassis cars, class 2, 301 to 450 inches.

Event No. 4—10-mile free-for-all handicap. Open to all cars entered at this meet. Cars will be handicapped in accordance with their performances at this meet by the board of official handicappers.

Special event—250 miles for Prest-O-Lite trophy, using both outside track and inside course.

FRIDAY, AUGUST 20

Event No. 5—Stripped chassis cars, class 3, 231 to 300 inches.

Event No. 6—Stripped chassis cars, class 2, 301 to 450 inches.

Event No. 7—Record trials to lower world's record. Free for all cars. Each car will be permitted to make two attempts. Electrically-timed.

Event No. 8—10 miles for cars of class 1, up to 600 inches.

Event No. 9—50 miles for cars of class 4, stripped chassis, 161 to 230 inches.

10-mile free for all, open as per class E of racing rules.

Event No. 10—5 miles, free-for-all handicap, open to all cars entered at meet. Cars will be handicapped by official handicapper in accordance with their performance at this meet.

Event M—100 miles for cars, class 3, G. & J. trophy.

Event M—For the Indianapolis Motor Speedway trophy.

SATURDAY, AUGUST 21

Event No. 11—Record trials from 1 kilometer to 10 miles. Free for all cars.

Event No. 12.—15-mile free-for-all handicap race. Open to all cars entered at this meet.

Event No. 13—5 miles, consolation, open to all cars that have not won a first prize at this meet.

Event No. 14—25-mile free-for-all event. Open to all cars.

National amateur championship for championship of America, 10 miles.

Event S—Indianapolis Motor Speedway trophy, donated by Wheeler & Schebler, 300 miles.

FAST WORK AT LEXINGTON

Lexington, Ky., Aug. 9—Record-breaking was the feature of the track meet here today. Jimmy Ryall, in a Buick, cut the 5-mile amateur mark to 4:52⅕, while John Aitken in a National won the 50-mile race in 53:28⅘. James Morris in a Packard won a 10-mile race in 11:52⅖, and Tom Kincaid in a National captured a race at the same distance in 10:03.

ENGINEERS' SUMMER SESSION IN CHICAGO

CHICAGO, Aug. 7—The summer convention of the Society of Automobile Engineers concluded its 3-day session here at 2 o'clock this afternoon, the meeting proving a particularly valuable one because of the nature of the papers read and the discussions which followed the reading of them. It was impossible to have read the paper on the testing of 20-horsepower Franklin air-cooled motor, which has been held over until the next meeting of the society, as was a paper by President Henry Hess. The session opened Thursday morning and the fifty-odd members immediately adjourned and made the 51-mile trip to the Algonquin hill-climb, where the afternoon was spent, the several engineers being among the most interested spectators of the event. Cars for transporting the engineers to and from Algonquin were provided by the local branch of the American Locomotive company.

On Friday morning the real convention opened, President Hess reading an invitation from J. C. Heinze at Lowell, Mass., inviting the society to Lowell during the stock chassis races to be held there in September. The first paper, "Commercial Test of a Pierce Water-Cooled Motor," read by Professor R. C. Carpenter, of Cornell university, was prepared by J. A. Luhrnan and J. G. Woodworth, of Cornell, under the supervision of Professor Carpenter. The reading of the paper proper was prefaced by a series of screen views showing the construction of the Pierce six-cylinder motor and which was in turn followed by illustration of the manograph and a brief description of it, together with its advantages and shortcomings.

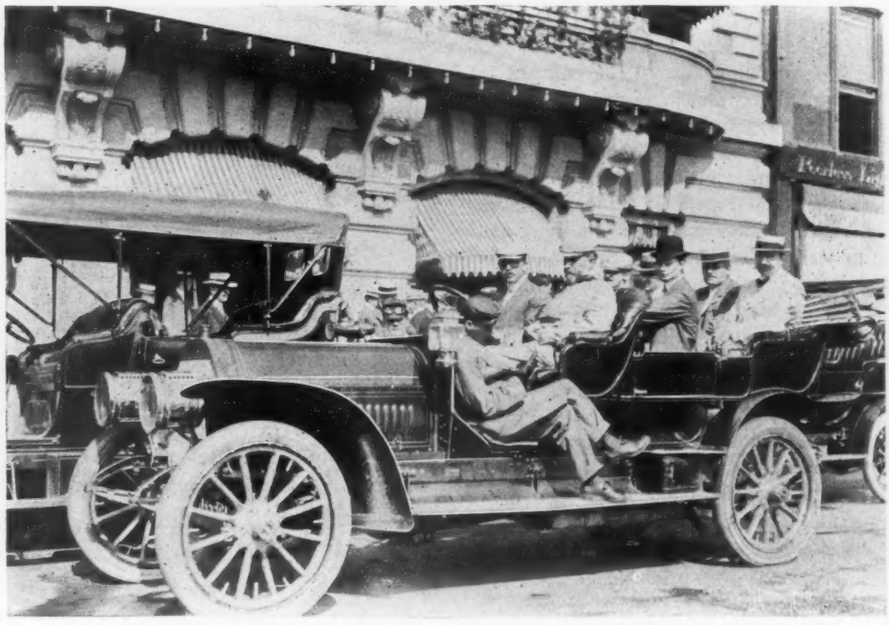
An equally interesting paper of the morning was "Some Points in the Operation and Care of Vehicle Batteries," by H. M. Beck, which included the advantages and disadvantages of the ampere-hour meter which has been introduced during the present season and which is meeting with considerable favor as an adjunct to the meters on an electric vehicle. The focal point of the paper consisted chiefly in the attention that should be given to a battery before it finally collapses, which is of paramount importance in that it is difficult to detect the ills of a battery because of its apparent simplicity. This nevertheless does not in any wise excuse operators of vehicles for mistakes made. The discussion on this paper was particularly interesting, Frederick J. Newman, of the Woods company, Chicago, taking the view that the testing of storage cells by the hydrometer is more reliable than that of the ampere-hour meter. Mr. Newman, while recognizing the benefits of the ampere-hour meter, was afraid it might be too generally depended upon to the damage of the battery. In reply H. M. Beck took the stand that the ampere-hour meter was not looked upon as a cure-all for storage battery conditions, but served a useful purpose in that it is a quick method of knowing the exact charged or discharged condition of the battery at any time.

In the discussion on this paper one of the general points made by all of the speakers was the fact that frequently all the ills of a commercial vehicle are blamed to battery troubles; whereas, frequently the tires, alignment of the runing gear, and other parts of the car are responsible. Mr. Newman told of a common trouble being poor alignment of the steering wheels which can be readily detected by the wear on the tires. Where this alignment is at fault, more power is required to propel the vehicle and as often happens the battery is blamed when it is not a fault at all.

Frank Lloyd read a short paper on "Lubricating Oils," in which attention was drawn to the vast varieties of oils, many of which are alike, although marketed under many different names. He compared the crudes of the different states and drew attention to the different qualities possessed by each. The paper, which will be published later in these pages, gave a lucid explanation of the various terms applying to oil tests and qualities, such as flash test, fire test, viscosity, etc. A point dwelt upon by the speaker was that frequently gasoline used contained a percentage of carbon which in the process of combustion is deposited in the cylinders, causing carbonization, which in scores of cases is blamed to the lubricating oil.

Secretary Alex. Churchward's paper on "Energy and Consumption of Commercial Vehicles" consisted of a vast amount of invaluable data on the loss of power due to tires, transmission losses, road resistances, wind resistance, grades, springs, using direct gear ratios, stops made during the day, and the methods of acceleration. Secretary Churchward also read a paper prepared by H. S. Baldwin on the "Electric Cradle Dynanometer Used for Testing Gasoline Engines." The paper opened with a comprehensive historical sketch on the use of dynanometers for testing, the accuracies and inaccuracies of it, and concluded with a complete sketch of the electric cradle type so popular in a great many of the factories at the present time.

During the stay of the engineers in this city they were entertained by F. J. Newman, of the Woods Motor Vehicle Co., of this city. The majority of the members made their headquarters at the Illinois Athletic Club, where the Friday morning session was held. On Friday afternoon upwards of a score or more accepted the invitation of the Pullman Palace Car Co. to visit the factories of the company at Pullman, Ill. Saturday morning the sessions took place at the South Shore Country Club near Jackson park, and one of the show places of the city. After the adjournment at 2 o'clock Saturday afternoon a luncheon was served at the club by the Woods company, after which the members interested themselves in golf.



ENGINEERS READY TO START ON TRIP FROM ILLINOIS ATHLETIC CLUB

WOMEN TOURISTS IN FRISCO

San Francisco, Cal., Aug. 8—Mrs. John R. Ramsey and her three women companions have reached San Francisco after 35 days of touring in a Maxwell. They left New York June 9 and they are the first women to make the transcontinental journey alone.

REVISION OF CONTEST RULES IS PLANNED

INDIANAPOLIS, IND., Aug. 9—A revision of the rules is planned at the meeting of the rules committee of the Manufacturers' Contest Association which will be held in this city during the 3-day meet which will open the new speedway next week. This announcement is made by Chairman Howard E. Coffin, who has issued a statement in which he says:

"At this meeting will be discussed by the members of this committee all recommendations regarding the rules, changes in rules, classifications, etc., for 1910. All changes suggested by the actual experiences of the present season will be considered. The 1909 rules of the contest board of the American Automobile Association are the result of the combined efforts of the general rules committee of the Manufacturers' Contest Association, the contest board of the American Automobile Association and the advisory committee of the M. C. A., representing this body upon the contest board. It is unfortunate that the incorporation of the M. C. A. occurred so late in the spring of this year that the revised classifications and rules could not be announced at the beginning of the season. Otherwise there would have been avoided much of the uncertainty that has existed in contest matters during the early part of this year.

"In September, immediately following the August meeting of the general rules committee, and as a direct result of the findings of this committee, announcement will be made as to the changes in the present governing rules and classifications, accompanied by the publication by the contest board of the A. A. A. of the annual rule book, wherein will be covered all conditions governing motor car events to be held between the dates of January 1 and December 31, 1910. At the same time will be published a complete schedule giving the approximate date and all necessary information pertaining to each and every contest of importance which is to be run during the season of 1910.

"With such an announcement made in September, coupled with the publication of the rules and conditions, which become effective January 1, there can be little reason or excuse for a lack of preparation upon the part of any manufacturer or importer who proposes to make entry in contests of any kind.

"The Manufacturers' Contest Association does not control contests either local, national or international. In all national affairs this association recognizes the direct and supreme control of the contest board of the American Automobile Association. All international matters clear through are handled by the Automobile Club of America. The exact relations existing between the M. C. A. and the other two organizations mentioned are outlined in formal contracts, which have been or soon will be executed in due form.

"Printed blanks have already been sent out from the secretary's office of the Manufacturers' Contest Association to those manufacturers and importers enrolled as members, and upon these blanks are being sent in the suggestions which will outline the attitude of the majority upon all items of national and international importance. All recommendations upon international matters will, after discussion at the August meeting, be formally transmitted to the Automobile Club of America, and will later, through its delegates, be presented at the international conference abroad at its next session.

"Among the more important subjects to be discussed in Indianapolis are the following:

1—Recommendations as to changes in the classifications and weights for 1910 season.
2—Changes to be recommended to the contest board for the American Automobile Association rules of 1910.
3—The possibility of the support by the Manufacturers' Contest Association of an impartial and thoroughly capable technical committee, which shall serve at all competitive contests.
4—The arrangement of a definite and logical schedule of all important contests for the season 1910, with a view to the announcement in September of this year of the approximate dates, character and general conditions governing all such events.
5—National events. How many shall be supported and of what character?
6—International events. How many shall be supported and of what character?
7—Endurance contests. Action to be taken upon the recommendation made by the National Association of Automobile Manufacturers, that only one endurance contest be scheduled for any one section of the country, and not more than four be supported by manufacturers' entries.
8—Road racing versus track events upon specially constructed speedways of any less than 2 miles in circumference.
9—Shall racing upon existing mile and ½-mile horse tracks be countenanced or supported in any way?
10—A standard electrical timing device for the elimination of human error in the timing of all important speed events.
11—A satisfactory definition of the term "stock car."
12—Steps to insure the enforcement of the rule governing the character of the publicity matter employed by any maker covering the performance of his cars in any contests. All such publicity must be in accordance with the facts.
13—A formula for the proper comparison of the performance of steam and gasoline automobile motors.

MEMBERS OF SOCIETY OF AUTOMOBILE ENGINEERS AT PULLMAN

FATE OF NEW BILL IN DOUBT

Hartford, Conn., Aug. 7—Motorists throughout the state are much worked up over the possibilities following the signing the new motor bill. The impression was general that owners whose licenses expired this month would be required to pay another fee next month and still another in January. Secretary of State Rogers has set the disturbed ones at rest, however, by the announcement that those whose licenses do expire this month will in reality be gainers under the new law by provision of which reissues will be dated January, 1910, and such licenses as are taken out after September 1 will be at a pro rata fee. This was misconstrued to imply that a full year's fee would be necessary. The clause which caused all the consternation referred only to new licenses and new cars, and those licenses expiring between September 1 and January 1 need not be renewed, the old licenses being allowed to remain in force during the interim and until the issuance of new ones. The fact that Governor Weeks has not as yet affixed his signature to the bill has led many to believe that the chief executive would return it to the legislature with his veto. Such being the case, it could of course become operative under a return majority vote. The impression is general with the optimistic faction that the proposed new law is destined to die a natural death and that the 1907 measure, the best the state ever has had, will continue to remain in force.

Vice-President of the United States

RICHFIELD SPRINGS, N. Y., Aug. 7—In the presence of nearly 2,000 people from the surrounding towns and cities, and viewed by James S. Sherman, vice-president of the United States, the first Earlington hill-climb went down into history today as the biggest event of its kind ever given in central New York. The weather was ideal and the course was in perfect condition. For a week previous to the contest the road had been treated every day with a new dust-layer, calcium chrolide, and the surface was found by th drivers to be ideal.

Many Tourists Present

Early in the morning touring parties began to arrive at the pretty little summer resort from all parts of the state. Syracuse, Utica, Schenectady, Albany, Oneida, and a score of other places were represented by their motoring enthusiasts, nearly 300 cars being stored in the garages or parked in the large open squares and parks in the village.

The main event of the day, the big free-for all, was won by F. K. Burnham in a 120-horsepower Fiat after a hard tussle with William A. Bourque in a 40-horsepower Knox. The first heat was done by both cars in :47⅖, and in the run-off Bourque did it in :48 and Burnham in 45⅕.

The star performer of the day was Bourque in the Knox. Out of four events he took three firsts and one second. Julian S. Brown, of Syracuse, in a Chalmers-Detroit Forty, was the only driver that came anywhere near the time made for the course by Burnham and Bourque, and he did it in :54⅗ in the free-for-all. When Brown finished the climb he was riding on the gasoline tank with his feet on the red-hot muffler from having struck the ditch three times, bouncing him off the seat.

The course was just 27 feet more than ¾ of a mile on the Wilder Hill, the starting line being exactly in front of the hotel, giving allowance for a flying start and plenty of room to stop after passing the summit. There is one slight curve half way up. A road in the rear provided a return without the use of the course. The road was rather rough, although it had been carefully groomed for the day and had been treated to prevent dust.

Burnham's 120-horsepower Fiat was the car driven by Lancia in the 1906 Vanderbilt. William A. Bourque was a star with his two 1910 Knox cars, taking three first places and one second, including a tie in the free-for-all with the big foreigner. Two new four-cylinder Maxwells captured the honors for the smallest machines. Simplex, Chalmers-Detroit and Stoddard-Dayton were other active participants. The lists were well filled previous to the date, but a number of machines failed to arrive and so there were but fifteen cars instead of double that figure which had been entered. Lack of entries, however, was compensated for by the several times each of the contestants appeared, both in the contest and in the practice periods preceding it.

The two Knox cars have new engines in which the bore has been increased ⅛ inch for the coming season, raising the horsepower to 40, and both the equipped runabout and the stripped car were very speedy. The former was well under the minute mark in winning its class events, one time being :57⅕ and the other :57⅖. The stripped car was handicapped somewhat by lack of weight for a rough road, but it fairly flew up the hill, winning a class in :48, and in the free-for-all it tied with the 120-horsepower Fiat in :47⅖. In the run-off Bourque dropped ⅗ second, his time being an even :48, whereas Burnham was able to cut his time to :45⅕, an average of exactly a mile a minute.

Competition opened with the event for the smallest cars admitted, those selling $851 to $1,250, and this was taken handily one, two, by the new Maxwell runabouts of 22.5 horsepower. The Hudson was a close third, however, for its time was but ⅕ second more than the 1:13⅕ of the winner. A Chalmers-Detroit Forty was a splendid runner-up to Bourque's Knox in two classes, the cars being evenly matched

SEE IN THE WINNING MAXWELL

VICE-PRESIDENT SHERMAN AND BURNHAM IN FIAT

SCENE IN FRONT OF THE EARLINGTON HOTEL, START OF RIC HFIELD SPRINGS HILL-CLIMB

Watches the Earlington Hill-Climb

in regard to engine size, and the Chalmers might have done better than its :54⅘ in the free-for-all if its seat had not slipped off. Summaries:

FOUR-CYLINDER STOCK CARS, $4,000 OR OVER

Car and driver	H.P.	Bore	Stroke	Time
Simplex, Burnham	90	6.1	5¾	:52
Thomas, Conde	53	5¾	5½	1:07 4-5

SIX-CYLINDER STOCK CARS, $3,000 OR OVER

Pierce, Ledermann	48	4½	4¾	1:15

STOCK CARS, $3,001 TO $4,000

Knox, Bourque	40	5	4¾	:57 1-5
Chalmers-Detroit, Hanna	40	5	4¾	:59 3-5

STOCK CARS, $2,001 TO $3,000

Knox, Bourque	40	5	4¾	:57 2-5
Chalmers-Detroit, Brown	40	5	4¾	:59 2-5
Stoddard-Dayton, Decker	36.1	4¾	5	1:08 4-5

STOCK CARS, $1,251 TO $2,000

Buick, Warren	32.4	4½	5	1:04

STOCK CARS, $851 TO $1,250

Maxwell, See	22.5	3¾	4	1:13 4-5
Maxwell, Sickinger	22.5	3¾	4	1:14 1-5
Hudson, Hanna	22.5	3¾	4½	1:14 3-5
Buick, Easter	22.5	3¾	3¾	1:15 2-5
Regal, Van Tyne	25.6	4	4	1:57

STOCK CHASSIS, 451 TO 600 CUBIC INCHES DISPLACEMENT

Knox, Bourque	40	5	4¾	:48

STOCK CHASSIS, 231 TO 330 CUBIC INCHES DISPLACEMENT

Buick, Warren	32.4	4½	5	1:02 4-5

FREE-FOR-ALL

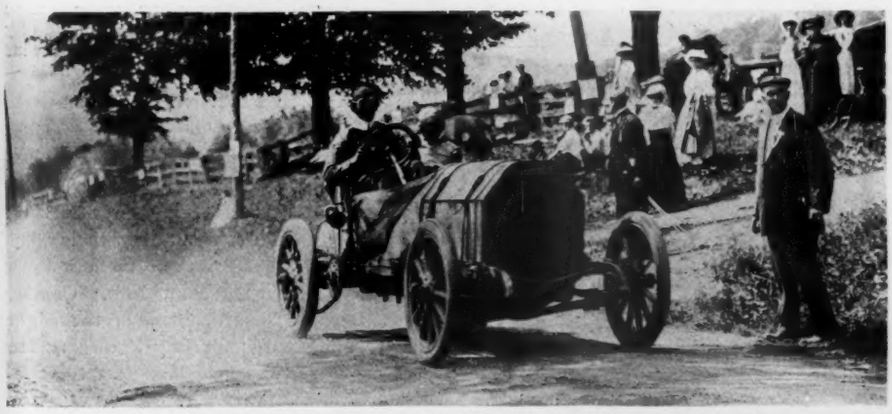
Fiat, Burnham	120	7	6½	:45 4-5
Knox, Bourque	40	5	4¾	:48
Chalmers-Detroit, Brown	40	5	4¾	:54 3-5
Thomas, Barclay	48.4	5½	6.1	:59 4-5

After the events had been run off the silver trophies donated by Gasherie De Witt, proprietor of the Earlington hotel, were handed out to the winning drivers by Vice President Sherman from the steps of the hotel. The big De Witt cup, which was a magnificent trophy, went to Fred K. Burnham. Mr. Sherman was afterwards taken over the course in the Fiat by Burnham and he expressed himself as enjoying the ride immensely.

At a meeting in the Earlington hotel Saturday evening the Automobile Club of Richfield Springs was organized, with Vice-President Sherman and Secretary F. H. Elliott, of the A. A. A., as the first two honorary members. It is the intention of the club to make the hill-climb an annual event. Next year the first state convention of the New York clubs will be held at Richfield Springs July 15.

On Friday of last week the people of

SIMPLEX, A CLASS WINNER



BURNHAM IN FIAT THAT WON THE FREE-FOR-ALL

Richfield Springs held a sociability run. The course was from the center of the village to Canadarago lake and around the lake twice, a total distance of about 24 miles, lake twice, a total distance of 24 miles. It was a secret time run, the official time having been previously fixed by Mayor Johnson at 2 hours.

The following is the result of the sociability run, with the time of each contestant:

Entrant and car	Time
A. Fiegenheimer, E-M-F	1:29:31¼
Dr. C. C. Ransom, Elmore	1:24:22½
Percival Jones, Knox	1:21:15¾
H. L. Conde, Thomas	1:21:14½
A. M. Zabriskie, Knox	1:20:21½
Joseph Kaeslin, Ford	1:18:35
H. F. Mansfield, Stevens-Duryea	1:18:27½
H. H. Cooper, Stevens-Duryea	1:18:04¼
T. J. Wetzel, Selden	1:17:58½
Oliver Drake-Smith, Cadillac	1:13:39½
C. B. Conrad, Pope-Hartford	1:13:06¾
C. W. Root, Haynes	:55:08

JEWEL COMPANY REORGANIZED

Massillon, O., Aug. 10—The Jewel Motor Car Co., of this place, has been changed to the Croxton-Keeton Motor Co., with capital stock increased from $250,000 to $500,000. H. A. Croxton, president and treasurer, is president of the Massillon Iron and Steel Co., as well as being president of two other large manufacturing interests. J. M. Keeton has in the past been associated with the Pope-Toledo and de Luxe companies. For 1910 the Croxton-Keeton Motor Co. is building three chassis, with a contemplated total output of 600 cars. The company has purchased the factory which the Jewel company has leased for the past 3 years, and its capacity has already been doubled. Plans are under way for a new addition 380 feet by 160 feet to be of one-story saw-tooth construction. An option has been secured on 7 acres of ground adjoining the present site. Three of the eight new models will be practically duplicates of the two Jewels which went through the recent Glidden tour in the hands of amateurs. Distributing branches have been established at Chicago, New York, Pitsburg, Cleveland and Boston, and others will be established.

BOURQUE IN KNOX, WINNER OF THREE OF RICHFIELD SPRINGS EVENTS

GOOD ROADS MEN TO PROBE THE DUST EVIL

CLEVELAND, O., Aug. 9—The tentative program compiled last week by the national committee of the second annual national good roads convention, to be held in Cleveland, September 21, 22 and 23, under the auspices of the American Automobile Association and other organizations, indicates that every subject of vital importance to the good roads movement will be conducted on broad lines. The interest taken in the convention by the United States office of public roads illustrates the growing sentiment, not only for securing proper highways, but the desire for improved methods whereby the most economical system of maintenance may be acquired with the utmost comfort to all users of the highway.

Among these the dust problem looms prominent. No subject at the present time possesses such widespread interest to the motorist, the farmer driving to town with his produce and, indeed, everyone on the highway, as that of dustless roads. Provost Hubbard, the United States chemist in the office of public roads, will explain the many difficulties in dealing with this problem, in addition to showing the degree of success obtained in various practical experiments in a paper on bituminous road materials. Logan Waller Page, director of the United States office of public roads, will bring out some sharp contrasts in his discussion of the road situation in the United States as compared with foreign countries. The farmers' interest in road improvement will be presented by T. C. Laylin, master of the Ohio State Grange. In this connection it is interesting to note that in many sections of the country farmers are now using wide steel tires, thus preventing the cutting up of ordinary roads due by the constant use of narrow tires.

The papers and discussions on these important road problems will be supplemented by many practical tests on the highways in and around Cleveland. There will be also an exhibition of road-making machinery, the largest of its kind that has ever been arranged in the United States, affording engineers and highway commissioners an opportunity to study every appliance used in road construction. The national committee issued invitations last week to the governors of every state to send from five to ten official delegates to the convention and the mayors of the principal cities have also been requested to designate representatives.

President Lewis R. Speare, of the American Automobile Association, will deliver the opening address in the Chamber of Commerce hall on Tuesday, September 21. Governor Harmon will welcome the delegation to Ohio and Mayor Thomas L. Johnson will deliver the address of welcome to Cleveland. Affiliated with the A. A. A. in conducting the convention are the National Grange, United States office of public roads, the American Road Makers' Association, the National Association of Automobile Manufacturers, the Association of Licensed Automobile Manufacturers, the American Motor Car Manufacturers' Association, and other national bodies interested in highway improvement.

DETROIT WILL HAVE MEET

Detroit, Mich., Aug. 10—A racing meet in connection with the Michigan state fair, which opens at Detroit September 2, will be conducted under the auspices of the Detroit Automobile Dealers' Association at the state fair track Friday and Saturday, September 3 and 4. John Gillespie is at the head of the committee which has the meeting in charge and considerable progress has been made in enlisting entries. The sanction of the American Automobile Association has been asked. A program of eight events each day will be put on. This will include not only racing events proper, but obstacle races and gymkhanas. Such noted drivers as Strang, Chevrolet, Burman, Knipper and Matson will appear in the professional races, representing various manufacturers. So far, $1,500 has been subscribed for prizes. The races are expected to be a big feature of the fair and will be extensively advertised. There is talk of building a permanent 2-mile banked track near the city which can be used for racing and also for testing purposes. That there is need of such a track at Detroit, no one disputes. The presence of such a large number of factories is the particular reason for the building of a fast track available to all, while the holding of races there would tend to quicken local interest in motoring as a sport. The old Grosse Pointe race course has been tentatively discussed as a site. It contains a mile track now, but the grounds are sufficiently large so that a 2-mile track could be constructed. It is expected that the project will be taken up more definitely during the fall and the possibilities absolutely determined.

TRACK RACING AT BUFFALO

Buffalo, N. Y., Aug. 7—Perfect weather, a good attendance and some sensational speeding were features of the motor car races held yesterday and today at the Fort Erie track, across the Niagara river from Buffalo. Among the exciting events today was the accident which occurred to Lee Lorimer, driving a Chalmers in the ninety-sixth mile of the 100-mile Canadian championship. His machine crashed through the back stretch fence of the track and was demolished. The driver escaped serious injury. Lorimer's opponent in this contest was Louis Chevrolet. After the accident to his rival Chevrolet continued the remaining 4 miles and won the contest in 1:44:32⅕. Another feature today was the defeat of Walter Christie in his Christie by Barney Oldfield in his new Benz in the concluding heat of the 3-mile sweepstakes. Summaries:

FIRST DAY

Exhibition mile, flying start, by Walter Christie in the Christie. Time, :54 3-5.

Exhibition mile, flying start, by E. C. Crocker in Peerless. Time, 1:07.

Exhibition mile, flying start, by Chevrolet, Buick. Time, :57 3-5.

Exhibition mile, flying start, by Barney Oldfield, Benz. Time, :55 2-5.

Exhibition mile, flying start, by Chevrolet in small Buick. Time, 1:04.

Three-mile, sweepstakes, first heat—E. C. Crocker, Peerless racer, vs. Walter Christie, Christie; won by Christie. Time, 3:19.

Five-mile open, free-for-all — Chevrolet, Buick, won; Lee Lorimer, Chalmers forty, second; Ed Jeho, Austin-Lyman, third. Time, 4:58.

Three mile sweepstakes, second heat—Christie won; Barney Oldfield, Benz, second. Time, 2:49.

Five-mile handicap, free-for-all—Chevrolet, Buick, won; E. C. Crocker, Peerless, second; Ed Jeho, Austin-Lyman, third. Time, 5:29.

Fifty-mile Buffalo derby for stock chassis—Chevrolet, Buick, won; Lorimer, Chalmers Forty, second. Time, 52:10 1-5.

SECOND DAY

Mile exhibition by Joe Matson in Chalmers-Detroit thirty, flying start. Time, 1:06 3-5.

Mile exhibition by E. C. Crocker in Peerless, flying start. Time, 1:00 3-5.

Mile exhibition by Louis Chevrolet in Buick, flying start. Time, :58.

Mile exhibition by Barney Oldfield in Benz, flying start. Time, :55.

Mile exhibition by Walter Christie in Christie, flying start. Time, :54.

Three-mile sweepstakes, first heat—Walter Christie, Christie, won; E. C. Crocker, Peerless, second. Time, 3:31 2-5.

Three-mile sweepstakes, second heat—Barney Oldfield, Benz, won; Walter Christie, Christie, second. Time, 2:54.

Ten-mile open, free-for-all—Louis Chevrolet, Buick, won; Ed Jeho, Austin-Lyman, second. Time, 11:35.

Ten-mile handicap, free-for-all—Louis Chevrolet, Buick, won; Ed Jeho, Austin-Lyman, second; Barney Oldfield, Benz, third. Time, 5:48.

One hundred-mile Canadian championship—Louis Chevrolet, Buick, won. Time 1:44:32 1-5.

KANSAS PLANNING TOUR

Kansas City, Mo., Aug. 8—Preparations are being made by the Automobile Club of Kansas City for its annual tour. The pathfinding car, a Studebaker-Garford, will leave Wednesday morning to lay out the route for a 5-day tour to include Junction City, Kan.; Lincoln, Neb.; Omaha, Neb., and St. Joseph, Mo., as the night stops. This tour, popularly known as the Star cup tour, was held last year to Oklahoma City and return, 1,000 miles. The trip was made in 8 days. Thirty-four cars rolled across the starting line and twenty-six finished. The Corbin won the silver cup given by the Kansas City Star. This year the Star is to give two cups, the club having decided to divide the tour into two classes, one for dealers and one for owners. The rules for the dealers will be more strict than for the private owners. The pathfinding car will follow the Glidden route as far as Junction City, Kan., where it will turn north through Clay Center and Marysville, Kan., to Lincoln, the capital of Nebraska. The route as contemplated is about 750 miles in length. The hardest day's run is believed to be that from Omaha to St. Joseph, about 185 miles, over roads none too good. A running schedule of 20 miles an hour will be in effect for the dealers' division

while the owners will have a schedule of 15 miles an hour. They will start a couple of hours ahead of the dealers in the morning, so that all may finish at night at about the same time.

The tour is to start from Kansas City September 20, the same date as last year. The route is through a section of Kansas and Nebraska where the motoring fever is high and where every little town of a few thousand inhabitants has its motor club.

CRY FROM RAILROADS

Boston, Mass., Aug. 7—Some idea of the way motor cars are cutting into the receipts of railroads is shown by the report just filed by an officer of one of the roads operating in New England with headquarters in Boston. In his report he said: "The general public has little conception of the effect which the increased use of the motor car is having upon the earnings of street railways and steam roads. While the gross earnings of the street railways have made a fairly good showing of late, they have not increased as much as the fine weather would seem to have guaranteed, and I figure that this is due in no small measure to the 20,000 odd motor cars which have been licensed in Massachusetts since last January and are now in steady use for summer recreation. During the past month alone more than 2,500 new motor cars have been delivered in this state, and if this rate of output should continue the effect on the earnings of the interurban roads may be serious. It is fair to assume that when a motor car makes a pleasure trip into the country it carries an average of three persons who, under former conditions, would use the railways, and applying this average to the 20,000 machines now in use thus far this year there results a loss to the railways of 60,000 passengers. It is therefore apparent that if the street railways in this state and in other parts of the country are to thrive an unusual amount of new business must be created to offset the motor car traffic, otherwise operating costs will have to be further reduced or fares increased to maintain the former average of net earnings. The motor car is not without its effect upon the summer earnings of the Boston and Maine, for figures show that 75 per cent of the guests arriving at the principal summer resort of New Hampshire, Bretton Woods, are coming in motor cars, a direct loss to the railroad, the only one reaching that place."

MOTORISTS RETALIATE

Providence, R. I., Aug. 7—The new motor law of Rhode Island has stirred up a hornets' nest in this city and also in the Attleboros, in Massachusetts, just over the state line, that promises to have some far-reaching effects before it is settled and may eventually lead to some sort of uniform legislation that will be reciprocative. The Rhode Island law states that any motorist from another state may not stay in Rhode Island more than 10 calendar days in any one year without registering. There is a penalty of $100 for not complying with it. As a matter of fact many residents of Attleboro and North Attleboro do much of their trading in Providence, making trips there by motor car and carrying home their merchandise, because it is nearer than going to Boston, the stores in Providence being large and up to date. Now they find that they are limited to ten trips, and as many of them have made that many they refuse to register in Rhode Island for the privilege of spending their money there. Already it is stated in Attleboro that three of its large business houses have withdrawn their funds from Providence banks to show their displeasure at the law. One Attleboro woman who does a large business with a Providence store, on learning that she could not make her trips in her car, cancelled the last order she gave, which was a large one. Attleboro physicians who are called to Providence and use motor cars feel the ban of the law and so they are turning their prescription trade more at home. Attleboro people who have summer cottages along the Providence river and go back and forth daily do not like the law, nor do the yachtsmen who motor to Providence and then go sailing. The Attleboro board of trade has taken the matter up, as has the Providence board of trade, but nothing can be done until the next legislature meets.

Minneapolis Reliability Postponed a Week

Minneapolis, Minn., Aug. 10—Because of a delay in securing a sanction from the A. A. A. the annual Tribune trophy reliability run has been postponed from August 17 and 18 to August 24 and 25. The run this year will be to Duluth and return, taking 2 days, the mileage being 186 miles, and everything considered the test will be a hard one but not so grievous as that of last year, when the cars battled for 2 days through mud and rain. The roads between Minneapolis and Duluth consist of good natural highways, in some other places quite heavy with sand, with some sand hills which will be most interesting. The noon control both ways will be at Sandstone, about 108 miles from Minneapolis, and it is between Sandstone and Duluth that the worst road conditions are encountered. There are stretches of corduroy road which are very rough and then there will have to be careful driving from Carlton into Duluth as the route goes down the winding boulevard hills for miles, crossing several railroad tracks and altogether requires alertness every second of the way. The Tribune trophy was given to the Minneapolis Automobile Club to be competed for for 3 years and then to go to the car making the best score for 3 years. The rules as drawn up by the Minneapolis club provide for technical examination before and after the run; economy of oil and gasoline figured out on a basis of ton mileage is also a factor in determining the score of the contestants and the fixed penalties for work replacements and repairs were very satisfactory. A sanction was granted by the A. A. A. last year and this year Chairman Hower said that the sanction would be granted. He intimated that the economy feature could still be retained, but that this year's A. A. A. classification of entrants according to price would have to be used. This change was made by the Minneapolis club, although the most desirable thing to do would have been to continue the run this year and next under the identical rules which were used last year. The delay in granting the sanction held up the entry blanks and rules and the charge is made that Chairman Hower seems to be hindering the Minneapolis club in its endeavor to continue this interesting and valuable event in northwestern motor circles.

CHEYENNE'S RACE CARD

Cheyenne, Wyo., Aug. 8—There are six events carded for the Cheyenne Motor Club races to be held August 17. The program will start at noon with a motor cycle race in which all of the entrants are from Denver. Following the motor cycle race will be a light car race for members of the Cheyenne Motor Club only, and then a race for cars listing at $2,000 or more, also for motor club members. There will be a 25-mile free-for-all event for a prize of $100, and then the feature of the day, the 200-mile race, will be called. The entrants in this event are: Harold Brinker, Moon; Martin Fletcher, Oldsmobile; Harry Ball, Marmon; F. J. McCarthy, Stearns; Judge E. C. Carter, Apperson; William Dineen, Buick.

WARSAW AFTER A SPEEDWAY

Warsaw, Ind., Aug. 10—Citizens of Warsaw are making efforts to obtain a motor park and speedway for that city. It is proposed to build the speedway around Center Lake, a beautiful body of water, although small, and to improve several acres of ground surrounding the lake as a public park. Mayor C. A. Rigdon, who owns much of the lake frontage, has agreed to donate his holdings for the purpose, while A. H. Brown, a farmer, has announced that he will not only donate what land he has in the vicinity, but will donate a liberal sum for building the speedway.

REGAL AT JOURNEY'S END

Stockton, Cal., Aug. 11—Special telegram—The Regal Plugger will reach San Francisco tonight, crossing the continent in 30 driving days, a great feat for a fully-loaded touring car in any class. The mileage is 4,110 miles.

EUROPE'S FASTEST PACE SHOWN BY JENATZY

AT THE BOULOGNE MEETING—JOERNS IN THE OPEL

BRUSSELS, July 22—Camille Jenatzy, the veteran Belgian driver, was the feature of this year's week of Ostend race meet. With his 1908 Mercedes grand prix racer he established a new world's record for the kilometer standing start mark, going the ⅝ mile the first time with the wind aiding him in 32.1 seconds and the second time with the wind against him in 36.1 seconds. The average time, or :34.1, is the new record and lowers the former mark by over 2 seconds.

Another speed showing of extraordinary nature was made by Jenatzy and his Mercedes on the third day of the meet, in the 20-kilometer race, or rather the two 10-kilometer standing start races. In the first heat, with the wind in his back, Jenatzy was specially timed during the last 2 kilometers, 1.24 miles—which distance was covered by the flying Belgian in :38, or 19 seconds to the kilometer. He thus averaged a fraction less than 120 miles an hour, the highest speed ever attained in a motor car on the continent.

Besides the great speed made by Jenatzy in his 6.1 by 6.8 Mercedes the best performances were those of Mathis in his Fiat and of Joerns in his big Opel. As a team the Opel cars almost made a clean sweep of everything, the Mathis Fiat being the only car in their way from taking first prizes.

It was the most successful week of motor racing in the history of Ostend. The speed trials were held on the specially-constructed road known as the route royale, which goes from Ostend to Wenduyne. The material used is macadam and granite mixed, and motorists who have tried this and other special motor roads consider the Belgian road as the best and fastest yet constructed anywhere.

This motor speedway is laid some 200 yards from the sea, high sand hills laying between it and the water front. A few yards from the motor roadway is the electric street car line, then a few yards further is a rather narrow state road and still 10 or 20 yards further and always parallel to the other road is a wider state road. On a clear day the view or scene from the top of the sand hills is a fine one. The races could well be followed from the hills, as one could see the start and finish very distinctly. Away in the distance, some 20 miles, can be seen the towers of the old city hall and also the cathedral of Bruges.

For the first time in the history of motor meets in Belgium two cars at a time were started and thus real races were provided. It was a successful innovation and some of the heats were so closely contested that not over a car's length separated the two contestants. On the other hand there were heats, like those in which the Mathis Fiat and the Opel of Joerns started, which almost resulted in a walkover for these cars. All the contestants were sent over the course twice, the first time the wind helping them and the second time the wind being against them. Classification was made by the addition of the times. The classification in the kilometer flying start event resulted as follows:

1—Mathis, Fiat, 4.6 by 7.5, :27 3-5, :30 2-5; total time, :58.

2—Lindpaintner, Opel, 4.3 by 5.9, :31, :32 2-5; total time, 1:03 2-5.

3—Jesserum, Opel, 4.3 by 5.9, :31 2-5, :32 3-5; total time, 1:04.

4—Lochner, Opel, 4.3 by 5.9, :31 1-5, :33; total time, 1:04 1-5.

5—Von Marck, Opel, 4.3 by 5.9, :32, :34; total time, 1:06.

6—Feron, Nagant, 4.1 by 5.1, :32 3-5, :35 3-5; total time, 1:08 1-5.

The fifteen other cars which were classified were the following in the order of their finish: Belgica, Berliet, Imperia, Pipe, Nagant, Charron, Vivinius, Germain, Opel, Opel, Excelsior, Pipe and three Imperias. The racing cars were classed as follows:

1—Pilette, Mercedes, 6.1 by 6.8, :23 2-5, :24 3-5; total time, :48.

2—Joerns, Opel, 5.1 by 9.4, :24 1-5, :25; total time, :49 1-5.

3—Lefevre, Itala, 5.7 by 4.7, :27 3-5, :29 2-5; total time, :57.

4—Fischer, Vivinius, 4.1 by 4.7, :30 3-5, :34 2-5; total time, 1:05.

Jenatzy did not start, claiming there was not sufficient room before or in front of the starting line to make a good flying start. In the kilometer standing start event the classification was as follows among the touring cars:

1—Mathis, Fiat	:40 1-5
2—Lindpaintner, Opel	:46 1-5
3—Petrowsky, Berliet	:46 2-5
4—Feron, Nagant	:47 3-5
5—Von Marck, Opel	:48 1-5
6—Van Zuylen, Belgica	:51 4-5

Among the racing cars the classification was:

1—Jenatzy, Mercedes	:35 4-5
2—Pilette, Mercedes	:36 -15
3—Joerns, Opel	:37 3-5
4—Fischer, Vivinius	:45

It was after these two events were run that Jenatzy went for the kilometer standing start world's record and succeeded in breaking the old mark.

On the second day there was a regularity contest over a course of 21 miles which had to be covered twice. The contestants were required either when making their entry or just prior to the start of putting down in writing the average speed at which they intended to cover the entire course of 42 miles. This average speed included the time that might possibly be taken up in case of repairs or other troubles affecting the car, as well as stops or slowing down in the villages or at crossings. It was, however, provided that the minimum speed was to be 15.5 miles an hour and the maximum speed 31 miles an hour. Time keepers were posted at places unknown to the contestants and were to take the time for stretches of at least 3.1 miles. For every second of difference either above or below the recorded times and the average speed the contestant had stated he would maintain there was a loss of 1 point.

Twenty-two cars faced the starter and twenty completed the contest. The winner turned out to be the only Opel car that started. The Germain lost only 10 points. Second prize went to the Berliet, which lost 13 points. An Imperia was third, having 22 bad marks.

The 12.4-mile race was the feature event of the third and last day of the meeting. The contestants drove from Ostend to Wenduyne, a distance of 10 kilometers, with the wind helping them, and then made the return trial with the wind against them, classification being made by adding the times. The general classification among the touring cars was as follows:

1—Mathis, Fiat, 4:45 3-5, 5:11 4-5; total time, 9:57 2-5.
2—Lindpaintner, Opel, 5:24 2-5, 5:49 4-5; total time, 11:04 1-5.
3—Lochner, Opel, 5:26 2-5, 5:38; total time, 11:04 2-5.
4—Jesserum, Opel, 5:32 4-5, 5:32 2-5; total time, 11:05 1-5.
5—Lefevre, Berliet, 6:01 2-5, 6:53 3-5; total time, 12:55.
6—Deguise, Imperia, 6:06 1-5, 6:53; total time, 12:59 1-5.

All the other touring cars made the 20 kilometers in more than 13 minutes. The racing cars were classed as follows:

1—Jenatzy, Mercedes, 4:30 2-5, 4:37 3-5; total time, 9:08 1-5.
2—Joerns, Opel, 4:39 3-5, 4:52 1-5; total time, 9:31 4-5.
3—Lefevre, Itala, 4:52 4-5, 5:16 3-5; total time, 10:09 2-5.
4—Gehenniaux, Berliet, 5:01, 5:24 1-5; total time, 10:25 1-5.
5—Fischer, Vivinius, 5:17 3-5, 5:45 1-5; total time, 11:02 4-5.

Trouncing for France

Paris, July 22—At this year's meeting of Boulogne the foreign element almost took away every one of the prizes. Opel, Fiat and Nagant are the names of the foreign cars winning, while the Rossel and Lion-Peugeot and Cottin-Desgouttes kept France among the trophy winners. On the first of the 2 days there was a 4.3-mile speed trial over a course with turns and a few upgrades that made a real test for cars going at top speed. The time winner of the day was a 5.1 by 9.4-inch Opel, the time being 3 minutes 22 seconds, the average speed per hour being 77.5 miles. A six-cylinder Rossel made second best time, 3:39⅘, and Giuppone in a Lion-Peugeot made the 4.3 miles in 5:25⅕. Among the touring car contestants the best time was made by a 4.3 by 5.9 Opel, which covered the course in 4:29. On the second day three events were run off and the total time for the three decided by the classification. The first event was a speed trial over a distance of 3 kilometers—1.86 miles—from a standing start. Event No. 2 was a 1-mile uphill from a standing start and event No. 3 was a hill-climb over a course of only .18 mile—300 meters—from a standing start and from the steepest part of the hill. The results were as follows, the times given being respectively for the 3-kilometer race, the hill-climb, the short-distance hill-climb and the total time:

RACING CARS

1—Joerns, Opel, 1:12 2-5, 1:12 2-5, :19; total time, 2:43 4-5.
2—Gaste, Rossel, 1:30, 1:14 3-5, :18 4-5; total time, 3:03 2-5.
3—Giuppone, Lion-Peugeot, 1:58 2-5, 1:42 2-5; :26 4-5; total time, 4:07 3-5.
4—Crespelle, Crespelle, 2:21 4-5, 2:14, :34; total time, 5:09 4-5.

TOURING CARS

1—Delaville, Cottin-Desgouttes, 1:50, 1:34 1-5, :24 3-5; total time, 3:48 4-5.
2—Lochner, Opel, 1:47, 1:37 2-5; :26; total time, 3:50 2-5.
3—Van Zuylen, Belgica, 2:02, 1:44, :38 1-5; total time, 4:24 1-5.
4—Wery, Nagant, 2:04, 1:53 1-5, :34 3-5; total time, 4:31 4-5.
5—Van Gorrisen, Opel, 2:08 2-5, 1:51 4-5, :34 4-5; total time, 4:35.
6—Agache, Rochet-Schneider, 2:15 3-5, 2:02, :32 2-5; total time, 4:50.

In the 300-meter hill-climb the best time was made by Mathis in his Fiat, who thus won the special prize offered to the winner of the special event. Mathis did not start in the other two events. The most-talked-about event of the day was the mile uphill, won by Joerns in his Opel.

Trial for Small Cars Carded by Germany

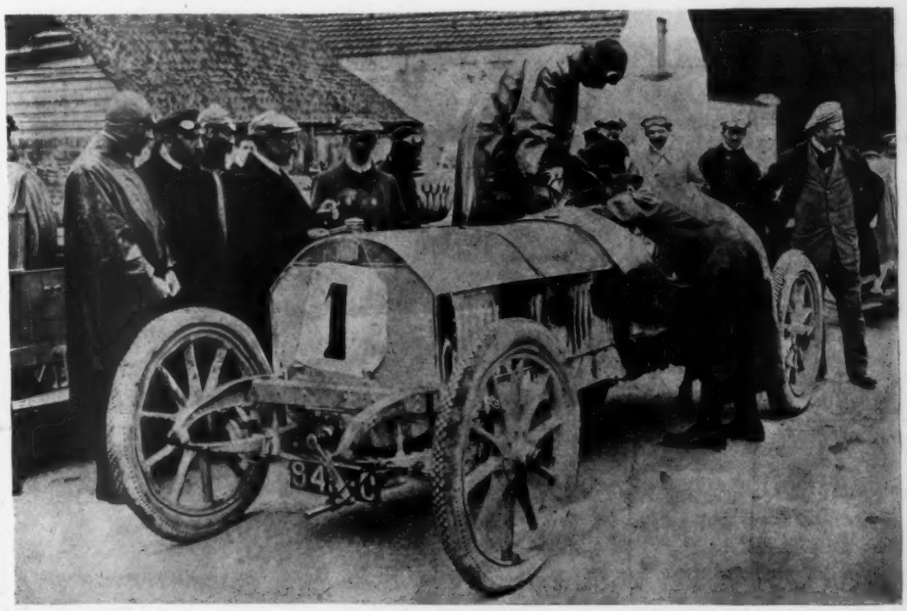
Berlin, July 26—The expectations of the promoters—the Kaiserlicher Automobile Club and the Deutsche Motorrad Verbund—of Germany's first international small-car trials promise to be fulfilled, judging by the entries thus far received. Fourteen different concerns have entered three cars each and when the lists close it is confidently expected that at least another half dozen concerns will have entered the trials, which are scheduled to take place from August 29 to September 2. No vehicle of over 6 horsepower will be admitted. There will be two classes of cars, those having up to 3.99 horsepower and those having more than 3.99 horsepower and not more than 6. The rules provide that a concern intending to take part in the trials must enter a minimum of three cars, but these may be of different construction or may be of different models, the only provision being that they are not of more than 6 horsepower. Should a manufacturer fail to show up at the start with the three cars he cannot start any. The cars will be driven from Berlin to Strassburg, approximately 625 miles, in four stages. The first will be Berlin-Braunschweig, the distance being 152 miles; the second stage is from Braunschweig to Weimar, about 150 miles; the third run will be from Weimar to Wurzburg, about 156.2 miles, and the last stage from Wurzburg to Strassburg, about 166.8 miles. For the first time in the history of motoring contests—in Germany at least—there will be only the driver on each car. In place of the other persons required—two at least on the cars of not more than 3.99 horsepower and four on the cars of over 3.99 horsepower—the weight will be made up with ballast at the rate of 155 pounds per person. The concerns having thus far entered are Adler, Berliner Motorwagen, Durkopp, Eisenach, Hansa, Ley, Neckarsulm, Ruppe, Stoewer, N. A. G., Brennabor Chatel, de Dietrich, French; and Turicum, Swiss. The Turicum, Neckarsulm, Ruppe and de Dietrich are two-cylinder cars, while the others are four-cylinders.

MAP OUT GOOD ROADS WORK

Spokane, Wash., July 28—The Spokane County Good Roads Association has been reorganized with R. Insinger, of Spokane, as president. Mr. Insinger was authorized to appoint an executive committee, which will employ a permanent secretary, and carry on with vigor the work of building good roads in this part of the northwest. To bring about the building of a modern highway, with a continuous line of shade trees, between Spokane and Coeur d'Alene, Idaho, 34 miles, is one of the enterprises planned. In this work the association will seek the cooperation of Coeur d'Alene, Post Falls and other valley towns, and of farmers and other property owners in Spokane and the valley. It also will ask the cooperation of the state good roads association and the county and township organizations. This project is incidental to the general plans of the association to aid in the building of good roads out of Spokane in all directions.

BUILDING MOTOR HIGHWAY

Frankfurt, July 24—The Frankfurter Automobile Club has been granted permission recently by the government of the state of Hessen for the construction of a special motor road in the confines of this city. The state road passing through Gespitz, Mitteldick and Morfelden has been selected and will be reconstructed for a distance of 3.4 miles. The material used will be a specially-prepared tar, and it is expected that work will be so pushed as to enable the club of holding its kilometer speed trials on the new road August 22. The club will spend from $4,000 to $5,000.



AT THE BOULOGNE MEETING—THE SIX-CYLINDER ROSSEL

The Readers' Clearing House

EDITOR'S NOTE—In this department Motor Age answers free of charge questions regarding motor problems, and invites the discussion of pertinent subjects. Correspondence is solicited from subscribers and others. All communications must be properly signed, and should the writer not wish his name to appear, he may use any nom de plume desired.

FOR IGNITION PURPOSES ONLY

Marion, Ind.—Editor Motor Age—Will Motor Age tell me if it is possible to charge a regular sparking storage battery from a U. & H. direct-current, high-tension magneto while running the engine from dry cells? I would also like to know if one can use incandescent lights operated from the magneto if proper connection is made. If so, would it interfere with the spark from the magneto at the same time? —Reader.

The U. & H. magneto is not a direct current magneto, nor can it furnish current for operating incandescent lights or charging storage batteries. This magneto is of the true high-tension type, which differs from the low-tension generator—in that the current is alternating, and the high voltage is produced in the armature winding direct—without the use of the separate induction coil. This magneto is designed for ignition purposes only. There is another magneto, however, on the market, whose manufacturers claim it may be used for the operation of incandescent lights as well as supplying current for the ignition system. This machine also furnishes an alternating current and therefor could not be used for charging a regular storage battery. A wiring diagram of this system is shown in Fig. 1.

MAKING QUIET-RUNNING MOTORS

New York—Editor Motor Age—A problem on which the engineers of the Association of Licensed Automobile Manufacturers have, with considerable success, spent a good deal of study and experimentation is that of making quiet-running gas engines for the cars of the A. L. A. M. members. Some of the principle causes of timing-gear noises are inaccurate machine work on the crankcase, causing too wide variation in the distance between gear centers; unsuitable crankshaft and camshaft bearings, causing jumping of the shafts when the motor is running; inaccurately spaced and poorly designed gears, causing warping after the strain of cutting the teeth is removed. The utmost care must be taken in fitting up cam gears, and sometimes one or two of the gears may be changed to good advantage, even though they are apparently the same size and shape. The chief cause of noise in timing gears is the uneven or intermittent load due to the lifting action of the cams, causing intermittent pressure on the teeth and even reverse pressures, producing slapping of the gear teeth, due to backlash. There are a number of points to be taken into consideration in ameliorating this condition, such as reducing the weight of the valve mechanism, proper tension of the valve springs, the use of suitable relatively non-resonant material, shaping cams to give soft action to the valve plungers, proper pitch and lubrication of gears, and amount of permissible back-lash. Noise from pistons, connecting-rods and crankshafts has been practically eliminated by good accurate work and bearings, and proper lubrication and clearance between the pistons and cylinders. All pistons and connecting-rods must be of equal weight and as light as possible. The crankshaft must not be too light; undue side-play of connecting-rods must be avoided. The principal cause of valve noise is allowing the valve to slap on its seat. The descent of the valve should be suddenly arrested just before it strikes its seat, either by a slight rise in the cam or by a very gradual taper. The valve spring should be of sufficient strength to keep the roller in contact with the cam. One leading experimenter says that in proper design the sound produced by the seating of the valve cannot be heard outside the motor with the manifolds, carbureter and muffler connected. The weight of valve is necessary to give the best result is a matter for mature consideration. The thickness of wall and shape of the manifold are also important.—Association of Licensed Automobile Manufacturers.

BURSTING OF FLYWHEELS

What Cheer, Iowa—Editor Motor Age—I have been told that motor flywheels have been known to burst or fly like a grindstone sometimes does. Could Motor Age tell me if this is a fact, and if so, what would have to be the conditions? It would certainly have to be going at a terrific rate to burst, would it not?—J. H. Ankerman.

After making numerous inquiries and consulting several authorities, Motor Age knows of no case of the bursting of a flywheel on an internal combustion motor from centrifugal force. One authority states that no case of the bursting of a flywheel with a solid rim on any high-speed engine is known. Motor Age is in receipt of a recent communication, however, in which it is stated that several instances are known to the writer in which cast iron flywheels with four fan blade spokes had broken and caused much damage. These of course must have been due to flaws in the material, and could hardly be attributed solely to centrifugal force.

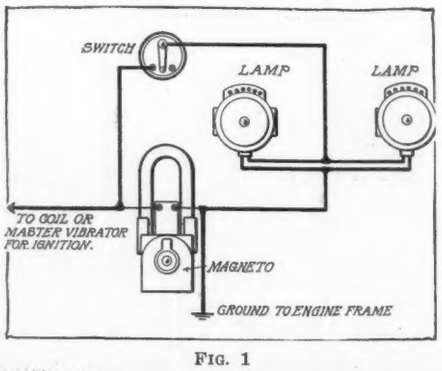


FIG. 1

CARBURETER IS AFFECTED

Elyria, Ohio—Editor Motor Age—My attention has been called to several unusual problems in motor-car work, and I take the liberty of asking Motor Age to give me its opinion on the same. Suppose I toured through the West in my car, built by an Eastern manufacturer, and during my trip I arrived at the city of Denver, the altitude of which is, I believe, about 5,000 feet above the sea level. 1—What effect would the lessened atmospheric pressure have on the carbureter's action? Could I remedy same, and how? 2—Would the lessened pressure affect to any noticeable extent the work of the gas mixture in the cylinders? 3—Would the explosive pressure be less by reason of the air being lighter and correspondingly smaller amount of oxygen per cubic foot? 4—Would not the water by reason of its lower boiling point at this altitude permit the cylinders to become dangerously warm? 5—What arguments are advanced for or against the use of subframes upon which to place or suspend the power plant—that is, the motor and transmission gear?—E. B. Guthrie.

You will find considerable difficulty with your carbureter when reaching altitudes of 5,000 feet or higher. 1—The reduced atmospheric pressure results in not enough air reaching the mixture so that either the air opening has to be increased or the gasoline flow cut off. The effect on the motor is a most perceptible sluggishness and failure to speed up to its normal crankshaft revolutions as well as failure to give power. During the recent Glidden tour not a few of the drivers found it impossible to climb grades on the highway on the road between Denver and Colorado Springs, which on other parts of the trip were readily taken on this speed, and in not a few cases they had to drop to intermediate, and in some cases to low speed. On the level practically all of the tourists found it almost impossible to get little more than two-thirds of their regular speed. 2—The reduced pressure reduced the power of the explosion in that there was not the same quantity of oxygen in

the combustion chamber as there would be at sea level. 3—The explosive pressure was less. 4—There was not noted on the tour any heating of motors in this section of the run. 5—The use of subframes is largely a matter of convenience of the different designers.

TO MAKE GEARS QUIET

Akron, O.—Editor Motor Age—I recently saw a gasoline motor which had the camshaft gear edged with some composition so as to lessen the noise. Will Motor Age inform me if teeth so made are durable, and is this form of construction common in motors?—S. M. Grant.

Gears edged with rawhide or fiber composition were quite common a couple of years ago before the tendency to house them in an oil-tight case, where they could run in a bath of oil, became so popular. They are successfully used on many motors.

SCREEN IN TWO-CYCLE MOTORS

West Chester, Pa.—Editor Motor Age—Will Motor Age inform me as to the value of the screen to prevent backfiring in a two-cycle engine, also what is the most favorable place for the screen?—H. M.

A fine-mesh screen is frequently used in the by-pass port of two-cycles to prevent backfiring into the crankcase where the mixture is conducted before going to the combustion chamber above. This by-pass channel is cored in the cylinder wall and is used to conduct the gases to the top of the piston. It is best to place the screen in this by-pass channel about the middle. It is customary instead of placing this screen at right angles across the passage to place it obliquely.

NO CARS IN YELLOWSTONE

Anamoose, N. D.—Editor Motor Age—I am contemplating taking a run, with a party of friends, out to Yellowstone park this summer. Can Motor Age tell me if we can drive our cars inside the park and what is the condition of the roads in that vicinity.—Dr. H. M. Erenfeld.

At present motor cars are not allowed in the Yellowstone national park, although the Cheyenne Motor Club is trying to have the park opened to cars. One of the routes recommended to the park is to Cheyenne, thence to Lander and to the park over the Military road. This road is recommended because of the bridges being in better condition.

CHANGING WHEELS

Terryville, Conn.—Editor Motor Age—My model D C Waltham delivery car was fitted with 26 by 2½-inch single tube tires, which are too light. I have just changed the drive wheels to 28 by 3 universal rim Dunlop tires. Of course, these are much heavier—probably twice as heavy as before—but they work and ride much better. Will it be permissible to make the same change on the front wheels? Will the steering knuckles stand the strain of so much heavier wheels, or will the strain be harder on the knuckles than the light single tube tires?—F. P. Tolles.

There will, of course, be a greater strain on the steering gear of your car if larger wheels are fitted. This would be due to the increased leverage brought about by enlarging the diameter of the wheel more than by the weight. However, the difference of 1 inch in the leverage gained by the larger wheel would hardly jeopardize the safety of your steering gear, and the change would be quite permissible.

SOUTHERN ITINERARY

Central City, Ia.—Editor Motor Age—I am planning to motor from Davenport, Ia., to Jacksonville, Fla., next September, and wish Motor Age would give me an itinerary for such a trip, showing the principal towns en route.—E. R. Wetherbee.

Motor Age suggests that you go by way of Chicago from Davenport, which will take you up the western bank of the Mississippi river to Clinton, passing through Pleasant Valley, Le Clair, Princeton, La Follett and Camamche. The Clinton-Chicago stage of the route is through Lyons, where you cross the Mississippi river to Fulton, Ill., thence through Union Grove, Morrison, Sterling, Dixon, Grand Detour, Oregon, Byron, Rockford, Cherry Valley, Belvidere, Marengo, Elgin, Ontarioville, Addison to Chicago. The Chicago-South Bend stage is through South Chicago, Hammond, Highlands, Hobart, Valparaiso, Westville, LaPorte and New Carlisle to South Bend. Thence to Indianapolis via Lakeville, Lapaz, Linkville, Plymouth, Argos, Rochester, Fulton, Metea, Logansport, Deer Creek, Carroll, Burlington, Middlefork, Michigantown, Boylestown, Kirklin, Rosston and Augusta to Indianapolis. From this point to Louisville the route is by way of Franklin, Seymour and Columbus to New Albany, crossing the Ohio river to Louisville. From Louisville through Bardstown, Mammoth Cave, Bowling Green, Franklin, Nashville, Murfreesboro, Shelbyville, Fayetteville, Huntsville, Scotsboro, Bridgeport, Chattanooga, Lafayette, Rome, Cartersville, Marietta, Atlanta, Griffin, Forsyth to Macon; thence follow the Central Railway of Georgia to Savannah. Savannah to Jacksonville is only some 90 odd miles and undoubtedly a direct route can be secured from the Savannah Automobile Club while in that city.

CAUSE OF MISFIRING

Parkstown, S. D.—Editor Motor Age—Will Motor Age through the Readers' Clearing House inform me why the back cylinder in my model E Mitchell runabout misses badly? The wiring is all right, the plugs are all good and I have a good contact at the timer; the valves are all in good condition and the battery is all right. Could I use a storage battery and dry cells in connection?—Emil G. Meisenhoelder.

Granted that your ignition system is in good order and compression good in all four cylinders, your trouble is probably due to an air leak in the intake manifold where it is connected to the cylinders. This may be tested while the engine is running, by applying oil to the crevice between the intake pipe and the cylinder. If the oil is sucked in, the joint will either need tightening or a new gasket should be

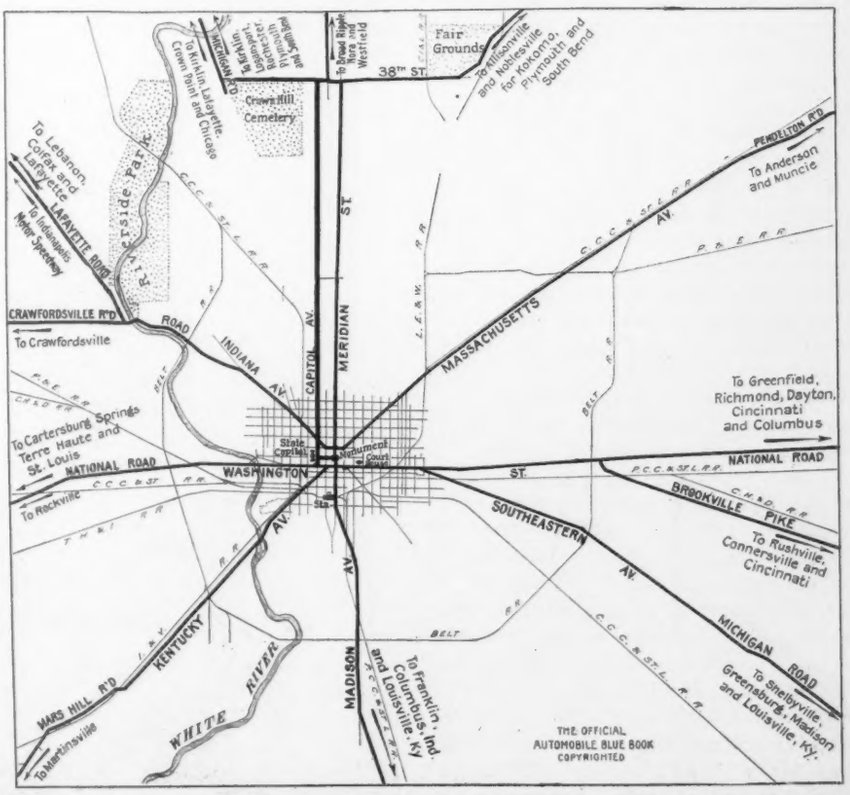


FIG. 21—COPYRIGHTED MAP OF INDIANAPOLIS, IND., SHOWING ENTERING ROADS—USED IN WESTERN EDITION OF BLUE BOOK

fitted. It would also be advisable to examine the valve cage of the last cylinder in the same way, and if a gasket is used on the seat of the valve-cage, inspect it also. You say the wiring and plugs are all right and that there is good contact at the timer, but you do not say whether there is a good spark at the plug. Test the plug while the engine is running by holding or laying it on the motor so that the ground portion of the plug which screws into the cylinder is in contact with the cylinder, while the insulated portion to which the wire is attached is held at a safe distance from any metal part of the motor. Then if a strong bluish spark jumps regularly across the points of the plug, your trouble undoubtedly lies elsewhere. If the spark fails at the plug, substitute the unit of the coil with one of the units of the other cylinders and your trouble may be found.

A NEW STYLE OF MOTOR

Peoria, Ill.—Editor Motor Age—With the present spirit of invention in the motor car, I thought it might interest some of your readers to illustrate a type of engine which is unique in several respects. This engine, Fig. 3, has a particularly large piston, of which the head H is close above the top of the connecting rod, but the walls of the piston W extend up and work in an annular slot S which is waterjacketed at one side. The main object of this motor is to prevent the piston and cylinder from becoming excessively heated to the extent of burning up the lubricant, and, as the illustration shows, none of the explosive gases in the combustion chamber K can get between the extension walls W of the piston and the cylinder walls C because the extension carries compression rings R at the top. This precaution makes the lubricating of the motor much easier in that the explosive gas cannot reach the wearing surfaces of the piston or cylinder, so that a particle of carbon cannot cut the surfaces. The piston, being 11 inches long, allows of attaching the conencting rod at the lower end so that the piston pin is oiled by the splash of the crankcase. This cylinder is shown with intake and exhaust valves in the head. The cylinder head G fits within the cylinder wall C, leaving an annular space between it and the walls for the extension W of the piston. It is provided with a flange F by means of which it is secured at the top of the cylinder by a series of bolts. With this motor the explosions are confined entirely within the piston cavity so that little of the heat of combustion reaches the cylinder wall C. The intake pipe N as well as the exhaust pipe M are formed integrally with the cylinder head G, and the respective valves are made with extra long stems which work in these pipes. This motor has no waterjacket surrounding the explosion chamber, but only at J in the cylinder head. Fig. 4 shows a four-cylinder design of this engine and from which it can be noted the waterjackets do not extend over

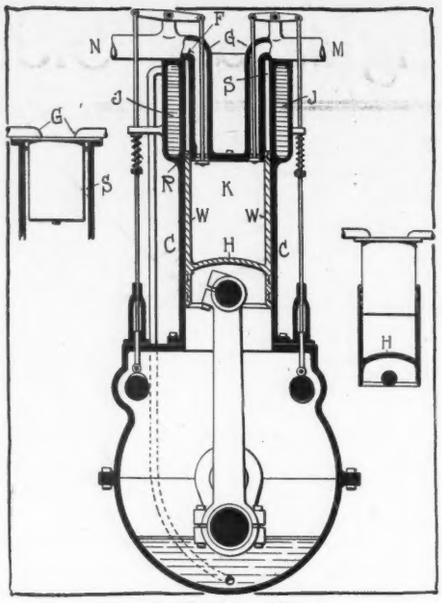


FIG. 3—KELLOGG MOTOR

the cylinder proper and how the water is conveyed from the jackets to the jacketed portion of the head. Two camshafts are used, one in each side of the crankcase, and the intake manifold is on the right side and the exhaust on the left.—W. S. Kellogg.

DES MOINES-DeKALB ROUTE

Perry, Ia.—Edtor Motor Age—Through the Readers' Clearing House will Motor Age advise the best route from Des Moines, Ia., to DeKalb, Ill., also distance? How many miles a day does Motor Age consider a good day's run, road conditions good, with a four-cylinder car? Is there any advantage driving with the muffler cut out?—L. B. M.

From Des Moines a good route will take the tourist through Rising Sun, Prairie City, Sully, Searsboro, Montezuma, Hedge, Millersburg, Parnell, Coralville, Iowa City, Graham, West Branch, Rochester, Wilton Junction, Walcott and Farnham to Davenport; thence the river route to Clinton, passing through Pleasant Valley, LeClair, Princeton, LaFollett, Camanche to Clinton. At Clinton cross the Mississippi river to Fulton, Ill., thence the route lies through Union Grove, Morrison, Round Grove, Rock Island Junction, Galt, Sterling, Nelson, Dixon, Nachusa, Franklin Grove, Ashton, Rochelle, Creston and Malta to DeKalb. Approximate distance is 260 miles. A good day's run for an ordinary touring party is 180 to 200 miles over average dirt roads. In case mud is encountered 100 miles will prove enough. There is great value with driving with the muffler cut out in that the power of the engine is increased, due to the elimination of back pressure which the muffler might set up. It is customary in the majority of cars to use the cut-out when touring in the country.

SIX-CYLINDER FUEL ECONOMY

New York—Editor Motor Age—In Motor Age, issue July 29, appeared a communication from Keokuk, Ia., regarding the relative economy of gasoline in six-cylinder and four-cylinder cars. Mr. Hobs, the correspondent, inquires if any manufacturers have entered six-cylinder cars in recent economy tests. We beg to call your attention to the 1-gallon efficiency contest of the New York Automobile Trade Association held on May 5. A six-cylinder 51-horsepower Lozier touring car won this contest for cars in its class, and, in fact, defeated every car in the contest with the exception of one single-cylinder car and a small air-cooled car, on 1 gallon of gasoline, and carring seven heavy passengers. The car traveled 17 1-10 miles, a record which I believe has never been equaled by any other large car. The Lozier car is made in two sizes, 45-horsepower four-cylinder and 51-horsepower six-cylinder, and the six-cylinder car is more economical than the four. Whether this is true of our other high-powered six-cylinder cars we cannot say.—Lozier Motor Co., C. A. Emise.

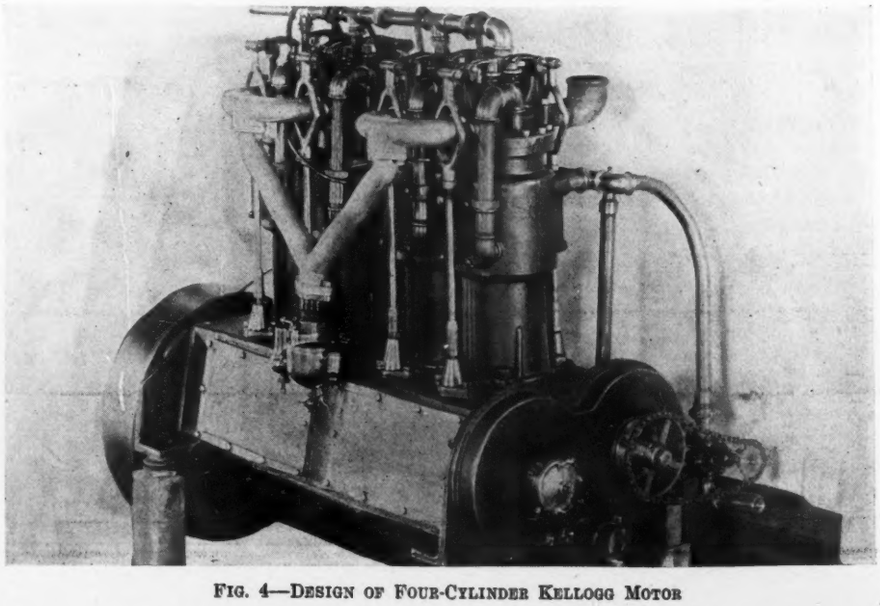


FIG. 4—DESIGN OF FOUR-CYLINDER KELLOGG MOTOR

Legal Lights and Side Lights

RIGHTS OF MOTORISTS ON ROAD

THE question of the rights of motor vehicles on the public highways has been decided by C. L. Baldwin of the justice court at La Crosse, Wis. The decision was given in the case of Edward Winner, a grocer, against Miss Mae Williams, to recover $50 damages, and was in favor of the defendant. The point involved was: How close to a horse, tied at the roadside, may a motor vehicle go without making the driver guilty of negligence in case of accident? The testimony showed that the car was being driven at a moderate pace, under its own momentum, the engine being dead, and when passing the horse was but 3 feet away from it. The horse broke away, but a bystander grasped the bridle. At this juncture Mr. Wimmer appeared and demanded damages for the damaged piece of harness. The plaintiff's attorney set up the claim that as the car was as close as 3 feet to the horse the driver was responsible. Mr. Wimmer and other witnesses testified that the horse was city-broke and not unusually frightened when near motor vehicles. The case is so unusual that appeals will be made to higher courts to determine the correctness of the decision.

DRASTIC RULES FOR CAPITAL

Washington motorists are worked up over the announcement that the district commissioners are formulating drastic regulations regarding exhaust from motors, unnecessary noises from motor cars, etc. The new regulations will stipulate that "no person shall locate, conduct or operate a motor vehicle of any kind whatsoever at or about any depot, church, theater, hotel, reception, or other place where the public may congregate, or within the limits of Rock Creek park, or Potomac park, or upon Pennsylvania avenue, Connecticut avenue, Massachusetts avenue, Fourteenth or Sixteenth streets, which emits from the exhaust or muffler of said motor vehicle any prolonged dense, or offensive quantities of smoke, gases, or disagreeable odors.

"That every motor vehicle of whatsoever kind operated in the District of Columbia shall be provided with a muffler, to be complete in construction so as to prevent any unnecessary, intense, or prolonged noise in the operation or management of said motor vehicle or the machinery in connection therewith, and said muffler shall not be cut out or put out of operation in any park or public grounds, nor in any built-up section of the district, nor where horses are present, nor for the purpose of warning others of the approach of motor vehicles. The operator of every motor vehicle shall close down the motor when the vehicle is in any park or upon any public street or in any public street or alley and not in motion, and any extraordinary, intense, or prolonged noise in any public park or upon any public street or alley incident to starting, moving or adjusting the machinery shall be a violation of this regulation."

The Automobile Club of Washington is preparing to put up a stiff fight against the adoption of these new regulations on the ground that they will tend to work an undue hardship upon motorists. It is pointed out that any policeman who may have a grudge against a motorist could have him in court all the time on the ground that his car was emitting dense smoke at times or that in shifting gears he made extraordinary noises. There appears to be no limit to the number of cases that could be made against motorists.

NEW SIGNBOARD LAW

One of the last laws signed by the governor of Wisconsin is chapter 405, repealing the statute making it optional with townships to erect sign or guide boards, and creating a new statute, which says:

The town board of each town in the state of Wisconsin shall cause to be erected and to be kept in good repair suitable and appropriate guide boards along all main-traveled public highways within their respective towns. The expense of the erection and keeping in repair of such guide boards shall be paid out of the treasury of such town. Such guide boards shall be erected between May 1 and November 1. Such guide boards shall be securely attached at the upper end of a post set in the ground, and shall when firmly set project 7 feet 6 inches above the ground. There shall be painted upon such guide boards in plain black Roman letters not less than 2½ inches high the names of adjoining or important towns or villages or cities to and through which said public highway leads, the distance in miles of such town, city or village from such guide post and any indication of direction which will be helpful to the traveler. If any person shall deface, injure or destroy any such guide board and shall neglect for the space of 10 days thereafter to repair and restore the same to as perfect a condition as it was previously, he shall forfeit $10 and also pay as damages to such town three times the cost of repairing such guide board, and it shall be the duty of every town supervisor who has knowledge that any such injury has been done to make diligent effort for the detection of the person by whom the same was done and prosecute in the name of the town and collect such damages for its use.

LETS WELL ENOUGH ALONE

After being threatened with a shoal of motor bills, fool and otherwise, it now begins to appear that the present session of the Georgia legislature will come to a close without the passage of a single motor law of any kind. The attempt to tax all motor cars in the state, which was made in the general tax bill, fell by the wayside. The other bills affecting motor cars were referred to the committee on roads and bridges. This committee plowed through a mass of wierd would-be legislation and finally worked out a bill, which it referred to the house with its compliments and recommendation. However, this body has been so busy discharging railroad commissioners and fighting for and against near-bear that it seems doubtful if the substitute motor bill will come up for discussion at all at this session of the legislature.

LEGAL CAMPAIGN IN WISCONSIN

The Milwaukee common council is considering an ordinance introduced by Alderman Eric Cramer Stern, the youngest member, providing a wheel tax for all motor vehicles, carriages, delivery wagons and other horse-drawn vehicles, excepting bicycles, the proceeds of which tax to go into the special street repair fund. The motor vehicle tax is graduated from $5 to $12, according to horsepower, and horse-drawn vehicles will be charged from $1.50 for single rigs to $15 maximum if the bill becomes a law.

Fond du Lac, Wis., is to have an ordinance providing traffic regulations, patterned after the Milwaukee rules-of-the-road ordinance.

The question of the legality of turning poles at street intersections has arisen in connection with the proposed ordinance introduced in the Milwaukee common council at the suggestion of Mayor David S. Rose. It is claimed by some aldermen that the poles constitute an obstruction. The ordinance provides for 4-inch iron poles, 8 feet high, set on a pedestal of stone, 3 feet square and 2 feet high, each pole to bear an 8-inch red electric globe. A sign, "Keep the Right" is to be hung on each pole. This is expected to aid in controlling traffic.

Racine, Wis., has adopted a set of road rules that includes the best rules adopted by other cities and several of the most important sections of the Wisconsin state law regulating motor vehicles. The usual penalties are provided in the new set of regulations.

NEW INDIANAPOLIS LAW

An ordinance requiring the registration and licensing of motor car and motor cycle drivers and operators has been passed by the Indianapolis city council and has been signed by Mayor Bookwalter. It will become effective about August 10. It requires that prospective drivers must appear before the board of public safety, giving names, addresses, ages, and make statements of qualifications for driving. An order will then be issued, which when presented to the city comptroller with $1 will entitle the holder to a license, which must be renewed each year. Penalties are attached for failure to notify the board of a change of address within 5 days or for failure to display the license certificate when requested to do so by the police of the city of Indianapolis.

OPERATION AND CARE OF VEHICLE BATTERIES

EDITOR'S NOTE—The following paper on "Some Points in the Operation and Care of Vehicle Batteries" was read by H. M. Beck at the summer convention of the Society of Automobile Engineers, held in Chicago August 5, 6 and 7.

WITH the rapid increase in the number of electric vehicles the question of the proper operation and care of the storage battery becomes one of increased importance, as the best vehicle will not run if the battery goes wrong. While under normal conditions the care of a battery is a comparatively simple matter, it must not on this account be entirely overlooked, and unfortunately, there has been some tendency recently to minimize the actual attention required. This policy is not new, having been tried in other lines of battery work, and if continued is sure to result disastrously. Why not rather admit that a certain amount of attention is required and insist upon it? The best battery can be ruined in a comparatively few charges or discharges, where it would have given a long life with proper treatment.

The instruction books furnished by the manufacturers go into the operation and care of vehicle batteries very completely, and as they have been revised from time to time, one of them now being in its sixteenth edition, they are up to date. It will not be necessary therefore, to go into many of the details of operation, but there are certain points which are either frequently misunderstood, or else on which it would be well to lay special emphasis, as their importance has apparently not been appreciated.

Chemical in Nature

A storage battery is chemical in its nature rather than mechanical, and must not, therefore, be confused with mechanical apparatus. The latter gives much more marked warning when it requires attention, and the fact that a battery may be apparently operating perfectly when it requires attention, is responsible for a great deal of battery trouble. When a battery finally breaks down permanent injury has been done, and although it can generally be doctored back into shape, it cannot be made to give the life it should have given. In probably no line of technical work is prevention rather than cure of so vital importance. Unfortunately the chemical theory of the storage battery never has been definitely settled, but an approximate idea of what goes on during charge and discharge can be easily stated.

A storage battery from an elementary standpoint, consists of two or more plates, positive and negative, insulated from each other and submerged in a jar of dilute sulphuric acid. The plates consist of finely divided lead known as the active material held in grids which serve both as supports and as conductors for the active material. The active material being finely divided offers an enormous surface to the electrolyte and thus electro-chemical action can take place easily and quickly. Two plates such as described would have no potential difference, the active material of each being the same. If, however, current from an outside source is passed between them, one, the positive, will become oxidized, while the other remains as before, pure lead. This combination will be found to have a potential difference of about 2 volts, and if connected through an external circuit, current will flow. During discharge the oxidized plate loses its oxygen and both plates will become sulphated until, if the discharge is carried far enough, both plates will again become chemically alike, the active material consisting of lead sulphate. On again charging, the sulphate is driven out of both plates and the positive plate oxidized, and this cycle can be repeated as often as desired until the plates are worn out. Thus charging and discharging simply results in a chemical change in the active material and electrolyte, and the potential difference between the plates and capacity is due to this change.

Care of Storage Battery

In taking care of a storage battery there are four points which are of the first importance: First, the battery must be charged properly; second, the battery must not be overdischarged; third, short circuits between the plates or from sediment under them must be prevented; and, fourth, the plates must be kept covered with electrolyte and only water of the proper purity used for replacing evaporation.

Although, as already stated, it is impossible to give an accurate formula for the chemical changes which take place in a storage battery during charge and discharge, certain facts dependent upon these are well established and are used as a basis for operation. These are the following:

Voltage: During charge the voltage of a battery gradually increases until the cells are fully charged, but it will then come to a standstill and will not rise any higher, no matter how long the charge is continued. The maximum voltage thus reached is not a fixed point, varying widely at different times, depending upon the age of the battery, the temperature, the strength of the electrolyte and the charging rate.

During discharge the voltage falls, and if the discharge were carried far enough, it would reach zero, but experience has shown that this point is much too low for safety, resulting in the rapid destruction of the plates.

Specific gravity: Due to the fact that during discharge the active material of both plates becomes sulphated, the specific gravity of the electrolyte falls. During charge the reverse process goes on, the sulphate is driven out, and the specific gravity of the electrolyte rises. As with the voltage, the gravity will rise gradually during charge until all the sulphate is driven out of the plates, but will then show no further increase, no matter how long the charge is continued. The maximum gravity thus obtained is also a variable figure, depending upon the temperature of the electrolyte as well as upon the actual amount of acid and water present in the cell.

The fall in gravity is almost proportional to the ampere-hour discharge; in other words, specific gravity readings can be used as an ampere-hour meter, but unfortunately, gravity readings are difficult or disagreeable to obtain in the case of vehicle batteries, so that this check on the discharge is not frequently used.

Gassing: Until nearly charged the plates in a storage battery should absorb the energy put into them with little or no gassing. When they are nearly charged the energy instead of being stored shows itself in the form of more or less gassing, the amount depending upon the rate of charge. During discharge a cell should never gas. If it does so, it is an indication that it has been run down much too low and needs immediate attention.

Voltage and Gravity Readings

Of the above indications, the first two, voltage and gravity are those most commonly employed in operating. Gassing, while of great assistance as a guide or warning, cannot be depended upon for accurate results, and is only used when nothing but the most crude methods of operation are practical.

Either voltage or gravity readings alone could be used, but as both have advantages in certain cases, and disadvantages in others, it is advisable to use each for the purpose for which it is best fitted, the one serving as a check on the other.

Voltage has the great disadvantage in that it is dependent upon the rate of current flowing. Open-circuit readings are of no value, as a cell reads almost the same discharged as it does charged. On the other hand, a voltmeter is a very easy

instrument to read and may be located wherever desirable.

Specific gravity readings are almost independent of the current flowing, but the hydrometer is difficult to read, not very sensitive and the readings must be taken directly at the cells.

Charge: In the case of the pasted type of plates used almost entirely in vehicle service, experience has shown that the manner of charging has much to do with the life of the plates, and on this account it is sometimes stated that the life of a vehicle cell is proportional to the number of charges, rather than the number of discharges. On this account it is wise to charge the cells as moderately as practical. On the other hand, it has been found that if the plates are to be kept in good condition, it is necessary to occasionally charge them to a maximum, thus reducing all the sulphate. Also, the different cells of a battery work as independent units, and while their efficiencies are approximately the same, there is generally some slight variation, which if the cells are charged on a very efficient basis, will sooner or later cause irregularity, the cells with the lowest efficiency dropping behind. It is necessary, therefore, occasionally to even them up or the low cells will get in trouble. To meet these conditions, charges are divided into two classes —regular charges which should be as efficient as possible, and overcharges given at stated intervals, which are carried to a maximum voltage and gravity, and intended to reduce all the sulphate in plates and even up any irregularity in the cells.

Charging New Batteries

Initial charge: New batteries are usually received in a charged condition, but when this is not the case, the plates being shipped dry, or where the battery has been taken out of commission, it requires an initial charge before it is ready for service. This charge is not a complicated matter, but requires considerable time, frequently over 100 hours, and there is a very general tendency to cut it short. When the initial charge is not complete the plates will not be properly formed, a certain amount of sulphate will remain in them which will produce local action, and the capacity and life of the cells will be materially reduced.

In regular operation it is well to charge at the lowest possible rate. A large part of the wear on the plates is caused by the gassing, and the amount of gassing is reduced by a lower rate of current. Since the gassing occurs almost entirely near the end of the charge, it is especially important that the charging rate be low at this point, so that when the available time is limited, the necessary number of ampere-hours can be gotten into the battery with the least possible wear by having the current rate high at the beginning of the charge and low at the end.

There is one point in connection with the charge which should be especially emphasized, namely, that the final voltage corresponding to a full charge is not a fixed figure, but varies widely, depending upon the charging rate, the temperature, the strength of the electrolyte and the age of the battery. For this reason charging to a fixed voltage is unreliable and likely to result disastrously. The charge should be continued until the voltage or gravity cease rising, no matter what actual figures are reached. Old cells at high temperatures may not go above 2.4 volts per cell, whereas if very cold, they have been known to run up to 3 volts.

Four Charging Maxims

The points to be especially emphasized in connection with the charge are:

First—On regular charges keep the rates as low as practical and cut off the current promptly. It is preferable to cut off a little too soon rather than to run too long where there is any question.

Second—Overcharges must be given at stated intervals and continued to a complete maximum. They should be cut off at the proper point, but when in doubt it is safer to run too long, rather than to cut off too soon.

Third—Do not limit the charge by fixed voltage.

Fourth—Keep the temperature within safe limits.

Discharge: The discharge largely takes care of itself, except that a battery should not be run down below its voltage limit. The rate of current has very little effect upon the life of the plates, provided the discharge is not carried down too far. Where a battery is completely discharged it should be charged as soon as possible, and if it has been run down too low the charge should be continued to a maximum similar to the overcharge.

The Ampere-Hour Meter

Many attempts have been made to develop apparatus which would automatically show the charge and discharge of a storage battery, but these have either been based on the wrong principles, or else the instruments would not stand the wear and tear to which they were subjected, and they have therefore not proved satisfactory. Within the last year or so, however, a mercury type of ampere-hour meter has been placed on the market, designed especially for battery use, and so far the results obtained have been very promising. This meter is equipped with a large dial and a pointer which can be set by hand to any point desired. The pointer revolves in one direction during charge and in the opposite direction during discharge, and registers directly the ampere-hour output or input to the battery. The mercury in which the armature disk is submerged acts as a dash-pot, and seems to be very effective in damping the vibrations and jolts which such a meter has to stand.

During discharge the meter shows directly what capacity has been taken out, so that it is a simple matter to determine what is left in the battery. For charging the procedure is somewhat more complicated, although not seriously so. It is necessary to charge a battery for from 15 to 20 per cent more ampere-hours than are discharged in order to make up for the losses in the battery. The method used to accomplish this is to move the pointer ahead the proper number of ampere-hours just before charging, then charge until the pointer comes back to zero. The meters are equipped with an electrical contact at the zero point, which can be made to automatically open the circuit if desired. As will be seen, this considerably simplifies the handling of the charge, but there is one point which must not be overlooked, and which should be strongly emphasized, namely, that the efficiency of a battery varies with the amount of work it does, being much lower for light work than heavy. In fact, as long as in commission, the battery needs regular charges, even if it does no work at all, in other words its efficiency would then be zero. This condition can be handled in several ways. Under average conditions it is probably safe to charge by the ampere-hour meter for a set period, say 2 weeks, provided at the end of this period the battery is given a regular overcharge. An alternative method is to give an additional charge once a week by the meter of whatever number of ampere-hours is found necessary to keep the battery up. The regular bi-weekly overcharge will probably be found to be the safer method, especially in private service where the conditions are so variable, but whatever method is used, too much emphasis cannot be laid upon the fact that if a battery is to be kept in good condition, in addition to the ordinary charges with the ampere-hour meter, regular overcharges must be given. The meter certainly gives promise of reducing the amount of attention a battery requires, but the danger is that it will therefore be assumed that it will eliminate all of it.

Battery Short Circuits

Short circuits between the plates are largely eliminated through the use of the wood separator. This point, therefore, does not need any special attention beyond that of seeing that the separators are in good condition when installed. With the sediment under the plates, however, the case is different. It is a natural tendency

to wish to run a battery as long as possible before putting it out of commission for overhauling. The result is that very generally the sediment is allowed to get up to the plates before the battery is washed. When the sediment reaches the plates, there is a discharge of wasted current through it, which in turn necessitates that the cell be given more charge in order to hold it up, and the extra charging again throws down still more sediment. Further, the sediment becomes sulphated and by local action with the active material of the plates in contact with it, causes the active material to become sulphated, which again increases the tendency to washing out. The result is that the plates begin to lose their active material rapidly if the sediment is allowed to collect until it reaches them, and it is, therefore, evident that if a battery is to give its normal life it is absolutely essential that the sediment be cleaned out before, and not after, it reaches the plates. The rate at which the sediment collects depends largely upon the way a battery is handled, and it is, therefore, necessary to determine this rate for each individual case. A cell should be cut out after say fifty charges, the depth of sediment measured and the rate so obtained, used to determine the time when the battery will need cleaning. As there is apt to be some variation in the amount of sediment in different cells, and as the sediment is thrown down more rapidly during the latter part of a period than at the beginning, it is always advisable to allow at least ¼-inch clearance. If the ribs in the bottom of the jars are 1¾-inch high, figure on cleaning when the sediment reaches a depth of 1½-inch.

Washing Storage Batteries

Before dismantling a battery for washing, if practical, have it fully charged. Otherwise, if the plates are badly sulphated, they are likely to throw down considerable sediment on the charge after the cleaning is completed.

There have been a great many complaints of lack of capacity from batteries after washing. Almost without exception this is found to be due to lack of a complete charge following the cleaning. The plates are frequently in a sulphated condition when dismantled and in any case are exposed to the air during the cleaning process, and thus lose more or less of their charge. When re-assembled, they consequently need a very complete charge, and in some cases the equivalent of the initial charge, and unless this charge is given the cells will not show capacity and will soon give trouble again. This charge should be as complete as that described elsewhere in connection with the initial charge.

Flushing or replacing evaporation in cells with electrolyte instead of water is a most common mistake. The plates of a storage battery must always be kept covered with electrolyte, but the evaporation must be replaced with pure water only. There seems to be a more or less general tendency to confuse the electrolyte of a storage battery with that of a primary cell. The latter becomes weakened as the cell discharges and eventually requires renewal. With the storage battery, however, this is not the case, at least to anything like the same degree and unless acid is actually lost through slopping or a broken jar it should not be necessary to add anything but water to the cells between cleanings. Acid goes into the plates during discharge, but with proper charging it will all be driven out again so that there will be practically no loss in the specific gravity readings, or at least one so slight that it does not require adjustment between cleanings. Thus, unless some of the electrolyte has actually been lost, if the specific gravity readings are low it is an indication that something is wrong, but the trouble is not that the readings are low but that something is causing them to be low, and the proper thing to do is to remove the cause and not try to cover it up by doctoring the indicator. The acid is in the cells and if it does not show in the readings it must be in the form of sulphate, and the proper thing to do is to remove the cause of the sulphation, if there is one, and then with proper charging drive the acid out of the plates, and the specific gravity readings will then come back to the proper point. The too frequent practice in such cases is to add electrolyte to the cells in order to bring up the readings, which as already explained, are only the indication of the trouble, and this further aggravates the condition, until finally the plates become so sulphated that lack of capacity causes a complaint. This practice of adding electrolyte to cells instead of water seems to be becoming more and more common. In general, it is much the safer course to assume that the electrolyte is all right and look for trouble elsewhere than to attempt to doctor it by the addition of more acid, and a great deal of trouble today is the result of a misunderstanding of this one point.

Restoring Weak Battery Cells

The treatment required for bringing a low cell or battery back into shape, while quite simple, is one of the most misunderstood parts of battery operation. The causes of low cells may be very varied, but the results produced and consequently the treatment required, is not so varied. The general procedure is as follows:

First—Restore the cell mechanically.

Second—Renew the electrolyte if there is any question as to its purity.

Third—Restore the cell electrically by charging.

Before dismantling a cell, if practical, have it fully charged, the mechanical restoration then simply covers the operation of examining the cell and putting it as nearly as posible back into its original condition. This should not be difficult for anyone who is familiar with the assembly of the elements.

Where there is any question as to its purity the electrolyte should be renewed, as the expense is not great in the case of the small cells used in vehicle service, and it would hardly pay to have an analysis made. Where any considerable amount of electrolyte is under suspicion, the manufacturers will gladly analyze the same. It is well to always have the water used for replacing evaporation and new electrolyte, unless furnished by the battery manufacturers, tested.

The most marked effect of an impurity is to cause the plates to become a bad color, the cells to become inefficient electrically and, in extreme cases, the plates may be ruined.

When the electrolyte is renewed the jar and plates should be thoroughly washed and the new electrolyte should be of about the same strength as that renewed in order to allow for any acid which may be in the plates.

The electrical restoration has been probably the greatest stumbling block, and largely through lack of understanding, as this operation consists in simply charging the cell until a maximum voltage and gravity are reached. The common mistake is to cut off the charge before it is complete, in which case, the plates being still sulphated, will not show capacity and are likely, through local action, to soon get into bad condition again.

Sulphating, Normal and Abnormal

With the possible exception of trouble due to an impurity, it can be generally stated that chemically the final condition requiring treating is abnormal sulphating, and even where an impurity is present in the electrolyte its action is assisted by sulphating. It should be understood that sulphating is a normal as well as an abnormal process in the charge and discharge of storage batteries, and the difference is in the degree, not the process. The abnormal condition is that ordinarily referred to by the term. In normal service sulphating does not reach the point where it is difficult to reduce, but if carried too far the condition becomes so complete that it is difficult to reduce, and injury results. A very crude method of illustrating the different degrees of sulphating is to consider it as beginning in individual particles

uniformly distributed throughout the active material. Each particle of sulphate is then entirely surrounded by active material. The sulphate itself is a non-conductor, but being surrounded by active material the current can reach it from all sides and it is easily reduced. This is normal sulphate. As the action goes further the particles of sulphate become larger and join together and their outside conducting surface is greatly reduced in comparison with their volume, so that it becomes increasingly difficult to reduce them and we have abnormal sulphate.

The general cure for sulphating is charging, so that a cell having been mechanicaly restored the electrical restoration consists simply in the proper charging. Sulphate reduces slowly and on this account it is a good plan to use a rather low-current rate. High rates cause excessive gassing, heating and do not hasten the process appreciably, so that it is the safer as well as the more efficient plan to go slowly. A good rate is about one-fifth normal. The length of charge will depend upon the degree of sulphating. In one actual case it required 3 months' charging night and day to complete the operation, but this was, of course, an exceptional one. The aim should be to continue until careful voltage and gravity readings show no further increase for at least 10 hours and an absolute maximum has been reached. In serious cases it may be advisable to even exceed this time in order to make absolutely sure that all sulphate is reduced, and where there is any question it is much safer to charge too long, rather than to risk cutting off too soon. A partial charge is only a temporary expedient, the cell still being sulphated will drop behind again.

Filling With Water

Since the specific gravity readings are affected not only by the charge, but also by the evaporation and changes in temperature, it is advisable, where an absolute maximum is to be reached, to eliminate these. The evaporation should be replaced with sufficient frequency to keep the electrolyte accurately at a fixed height above the plates. In this way water is added so frequently that very little has to be added at any one time, and the effect on the specific gravity readings is negligible. The temperature variations are eliminated by reading the temperature of the electrolyte, when specific gravity readings are taken, and correcting the latter to some standard temperature, such as 70 degrees Fahrenheit. This correction is made by adding 1 point—.001 specific gravity—for every 3 degrees above 70 degrees Fahrenheit and subtracting 1 point for every 3 degrees below 70 degrees Fahrenheit.

When the charge is complete the specific gravity of the electrolyte should be adjusted to the proper point and the cell is ready for service. Where there is time, and the facilities are at hand, it is a good plan to take a test discharge in order to make sure that everything is all right.

Failure in the restoration of low cells is probably more often due to cutting off the charge too soon than to any other cause, and from the troubles which are being reported this point evidently needs to be brought out more strongly.

In closing, a word or two about the vehicles themselves. As manufacturers we wish to admit without argument that the battery is the most important part of the vehicle, but, on the other hand, we would like to protest against the frequent practice of blaming the battery for everything that goes wrong. The battery is rated in ampere-hours, not mileage, and when the mileage of a vehicle falls short trouble should be looked for in the vehicle as well as in the battery. Batteries are regularly rated at their 4-hour discharge rate, this being about an average running rate for vehicles. The capacity, however, varies widely with different discharge rates, decreasing as the rates increase, so that anything which causes the vehicle to consume more current will more than proportionately reduce its mileage. For example, suppose that due to inefficient tires, poor bearings or binding brake, a normal current of 20 amperes is increased to 30 amperes. If the ampere-hour capacity were still the same, and there were no other losses, the mileage would be reduced about one-third. This increase in current, however, reduces the actual capacity of the battery by about 10 per cent. The average discharge voltage is also reduced and the drop in wiring of the vehicle is increased, so that the watts delivered to the motor are still further reduced, and finally the motor itself is somewhat less efficient at the higher rate, so that the net result is that the mileage of the vehicle instead of being reduced by one-third, is actually cut down by about one-half. It is thus evident how important it is that the vehicle as well as the battery be kept in the best of condition.

As has already been stated, no attempt has been made to cover many of the details of battery operation, but rather to emphasize and explain some of the most common errors found in the handling of the vehicle batteries of today and of these probably that which should be brought out most forcibly is the matter of flushing cells with electrolyte instead of water. Keep the plates covered with electrolyte, but use only pure water, not acid, for replacing the evaporation.

In discussing the ampere-hour meter Ernest Lunn said: "Some of the advantages claimed for the meter and proven as far as my observation has gone are: 1—It enables the driver to see at a glance how much of his battery capacity has been used up at any time. 2—It enables him to get an ampere-hour test on his battery every time he runs his battery out. 3—In commercial work it prevents the lazy driver from lying about the amount of charge left in the battery. Anyone who has had to do with commercial truck drivers knows very well that it is a habit that they acquire of saying that they have not sufficient capacity left in the batteries to make another trip, especially if it is along about 4 o'clock in the afternoon. 4—It gives the best kind of a check on the charge, provided the battery is charged on a voltage or gravity basis. 5—It has so far shown that it is a reliable meter to govern the charge, no other instrument except the regular volt-ammeter mounted in the switch board being necessary. This does not mean that the usual gravity readings should not be taken as a rule. 6—It enables the private owner who keeps his rig in a public garage to determine whether he is getting his battery fully charged. 7—It enables him, with the automatic cut-off device, to keep his motor car in his own barn with comparative safety. These are a few things that it can do. It is a question whether an instrument with so many virtues will be able to survive."

Cook Into Vehicle Faults

Frederick J. Newman said: "About the ampere-hour meter: That is a very old device. Recently a concern has brought out a new type ampere-hour meter as a new thing. The ampere-hour meter is a meter which registers ampere-hours. There are two types of that meter, one of which records the discharge, and then when you want to charge a vehicle you want to set the hand ahead a little bit to take care of the loss of charge, and then charge to zero. The other type is one in which the discharge travels at a faster rate than the charge; so that is compensated for. I think if we try to use the ampere-hour meters we are going to get into trouble, for this reason, if you are going to use them in pleasure vehicles, and the garage owners to save money in connection with the amount of 'juice' they want to give you, it won't take them very long to learn how to revolve that hand back to zero and you don't get the amount. In commercial service you can use a hydrometer. If you design the cars so that the batteries are accessible, so you can put the hydrometer into it and read your history, it does not need any $30 or $40 instrument to test it; a little $1.50 instrument will do the work, and you get that acid out of the battery. I think that ampere-hour meter will get us

(Continued on Page 33.)

MISCELLANEOUS LEVERS AND MOTIONS

By Thomas J. Fay

STRAIGHT-LINE designing possesses the merit of eliminating lost motion, undue wear and a certain class of troubles that follow when eccentric work is prominent. The superior product is that with the least number of parts. It is the height of fallacy to use extraordinary grades of material, purchased at great cost, difficult to procure, and only to be had from special heats, merely to enable the designer to employ crooked levers, and other parts that would be satisfactory in normal grades of material, were they but properly designed. Pull rods, for brakes, when they have bends in them, will fail to do the work in a proper and satisfactory manner, because when tension comes the rods will straighten instead of applying the full measure of pressure to the shoes. A pull rod with a bend in it is to all intents and purposes a spring. It is highly improbable that any designer would deliberately place a spring in the motion which is intended to transmit pressure to the brake shoes; this is exactly what is done when a pull-rod with a bend in it is used.

Links in compression are even less efficient than when they are in tension, if they have a bend in them, and when push rods are employed, which is not recommended in motor car work, they should be straight and as short as possible. If they have to be used at all, and if the length is great, they should be guided, and the laws of columns should be followed in every case. Since push rods are of mild steel, as a rule, they should be calculated on a basis of wrought iron, as columns with two pin-bearings, the formula being as follows:

$$P = \frac{40{,}000}{1 + \frac{1}{20{,}000}\left\{\frac{l}{r}\right\}^2}$$

When P = strength per square inch, in pounds.

l = length in inches.

r = least radius of gyration.

One-fifth of the value so found will be safe.

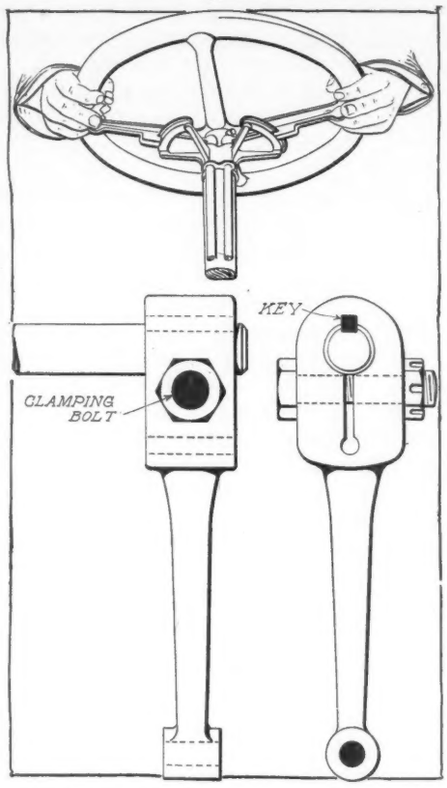


FIG. 1—CONVENIENT CONTROLS
FIG. 4—KEY AND CLAMP METHOD

The least radius of gyration, since it enters into the formula, dictates the use of a round section, under ordinary conditions, which may be solid or hollow, preferably the latter, by consulting the table of properties of sections afforded it will be evident at a glance that the tubular section will be stable and economical in the use of material.

In tension the section may be of any shape so long as it is uniform and the tension per square inch should be on a basis of about 12,000 pounds per square inch. It is a waste of material to have the rods stronger, and it is of the greatest importance in motor car work to limit the weight quite as much as a reasonable factor of safety will allow of. The area of the respective sections may be found as follows:

Area of a Round Section

If solid: $A = D^2 \times .7854$.

If hollow: $A = (D^2 \times .7854) - (d^2 \times .7854)$.

When A = area in square inches.

D = least outside diameter in inches.

d = greatest diameter of bore of hole in inches.

If the rod is threaded it will be at the root of the thread that the least diameter will be found as a rule; it is also at the root of the thread that rods are likely to part, due to the notch which is the point of concentration of the strain. If an irregular section is used, the area of the same will have to be determined, and if castings are employed they will have to be with a larger factor of safety than usual, and even then it is scarcely to be expected that the strength will be of a character to be relied upon.

In connection with small shafts and other parts in and about the power plant it is difficult to so design that the keys will have adequate bearing. In any event, if keys are not tightly fitted they will fail in service, and while it is desirable to use sufficiently large keys it is at the same time necessary to fit them as tightly as possible with a good bearing throughout the whole length on the sides only. The formula for proportioning keys may be used as follows:

Let D = diameter of shaft in inches.

B = breadth of key in inches.

L = length of key in inches.

T = twisting-moment in inch-pounds.

S′ = working stress of shaft in pounds per square inch.

S″ = working stress of key in pounds per square inch.

$$\text{Then } T = \frac{\pi D^2 S'}{16}$$

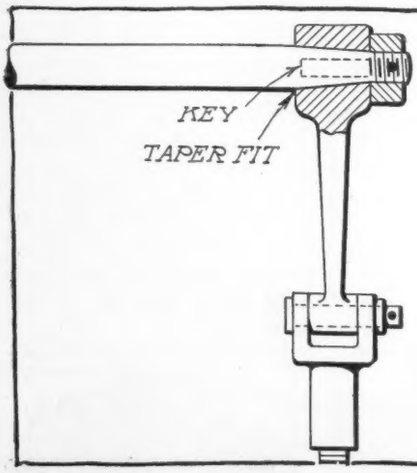


FIG. 2—KEY AND PULL-UP NUT

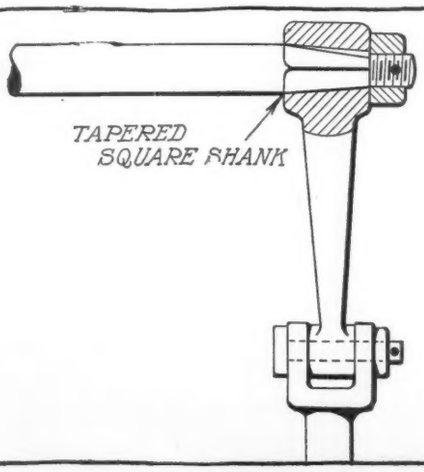


FIG. 3—NO KEY USED

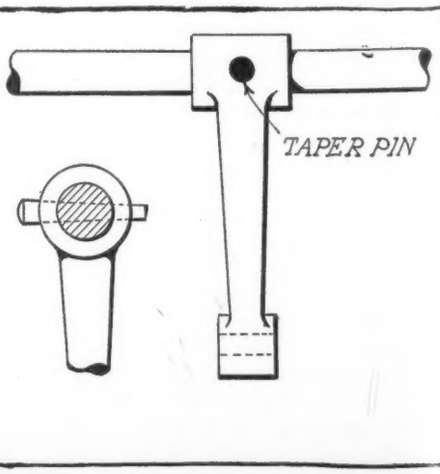


FIG. 5—USING TAPERED PIN

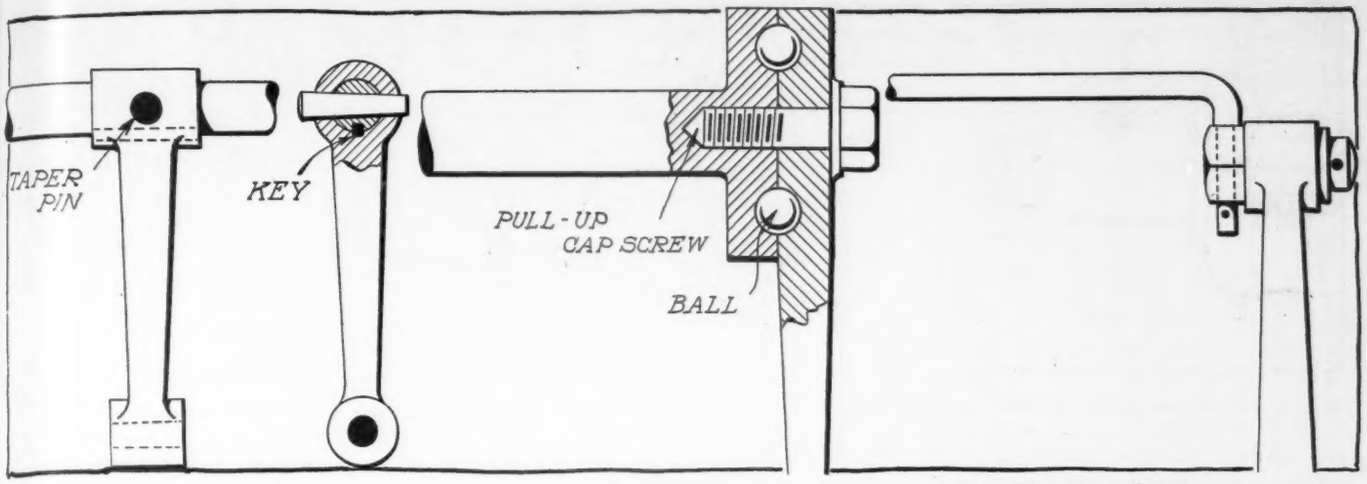


FIG. 6—THE TAPER PIN SYSTEM

FIG. 7—FLANGE UNION

FIG. 8—UNIVERSAL UNION

If the key is from the axis a distance equal to:

$$Y = \frac{D}{2}$$

Then $T = B\,L\,S''\,Y$

Since the strength of the key should equal that of the shaft:

$$\frac{\pi D^3 S'}{16} = \frac{B\,L\,S''\,D}{2}$$

$$\text{And } \pi D^3 S' = 8\,B\,L\,S''$$

$$\text{Hence } L = \frac{\pi D^2 S'}{8\,B\,L\,S''}$$

Divers Methods Are in Vogue

Referring to the methods of securing linkages and levers of the several varieties to torsion members it is important to note that good fitting takes precedence of everything else. It makes no difference which method is selected insofar as stability is concerned if the fit is below a certain standard. Convenience, Fig. 1, is a prime requisite and to this convenience must be coupled a certain harmony which will follow if the whole plan is carefully thought out. Having fixed upon the parts to be used and when they are placed in such a way as not to interfere with each other, it is then proper to consider the details, as the way the levers are to be secured to the shafts, one of which, shown in Fig. 2, representing a fit is prevented from turning by means of a key and is held on the shaft by a nut which in turn should be prevented from backing off, for which purpose a cotter-pin serves very well, but the nut should be castellated.

Fig. 3 represents a modification of Fig. 2, in that the shank is square instead of round, but it is not enough to have it so; the fit should be such that the nut will have to be brought up against the hub, in order to force the lever on against the tapered square, otherwise there is no use in tapering. It is also important to provide a full bearing for the entire length of the hub, and if the shaft is blued when the lever is put in place and then taken off again the blue will show if the bearing is for the entire length.

Fig. 4 is of a lever keyed on to a parallel shaft and the hub is split for the entire axle distance on the inside sufficiently far back to enable the clamping bolt to do its work of clamping the hub tight on the shaft, as well as preventing the lever from drifting off. In some cases the nut is dispensed with, in which cases the clamping bolt cuts through the shaft sufficiently to hold the lever in place. Fig. 5 shows a lever that is held from turning on the shaft and from drifting off, by means of a taper pin; this plan is absolutely worthless in motor car work, and even when a key is used in conjunction with the taper pin, as shown in Fig. 6, the idea is barely good enough to consider. In all such work, since parallel fits are used, it is important to have the bore of the hub so close that a press fit will follow. Grinding is necessary in such cases, and the allowance to make for the press fit depends upon the diameter of the shaft.

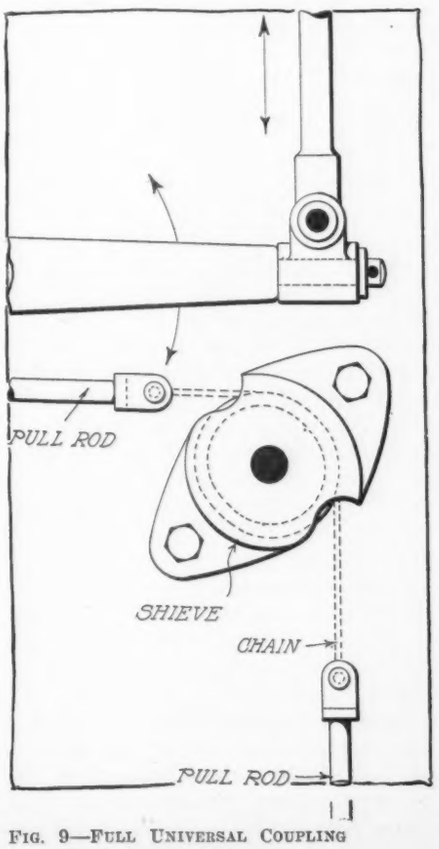


FIG. 9—FULL UNIVERSAL COUPLING
FIG. 10—A SHIEVE SYSTEM

Fig. 7 represents a plan involving a flange and one pull bolt in addition to two balls placed to take the torsional effort. This plan is shown with the lever coming on the end of the shaft. The flanging scheme may also be used in the conventional way, with bolts around the periphery. Fig. 8 indicates a universal connection used in conjunction with spark-advance linkages, and it has the advantage of serving in cramped space; in this case the linkage is given a right-angled turn at its end, and is fitted into a hole in the head of the bolt, passing through the lever boss.

Fig. 9 is of a conventional type of full universal, possessing many advantages, among which long life is prominent. In this plan long bearings are possible and the fit may be close enough to eliminate lost motion. If the nature of the work demands, bronze bearing brasses may be used, and in such cases it is important to have the brasses very thin; thick brasses have a tendency of squashing and the hole becomes elliptical, producing lost motion.

Fig. 10 is of a shieve, and is much used in connection with carbureter and spark-advance levers. It represents great flexibility, and when rods are used at all points excepting at the shieve, the plan is quite free from changing length. A spring is used to draw the linkages in one direction, and the motion is positive in the other. Fig. 11 represents a taper fit in connection with levers of great responsibility, and when the taper is right, say ⅜ inch to the foot, if the hub is pulled up on the taper with some pressure this form of holding will give absolutely no trouble at all. The key should be in accord with the formula contrived for dimensions of keys, but care should be exercised not to cut away any more of the bearing metal than a well-designed key will require.

Fig. 12 represents a modification of the taper fit given in Fig. 11, the difference being that the later is on a square shank;

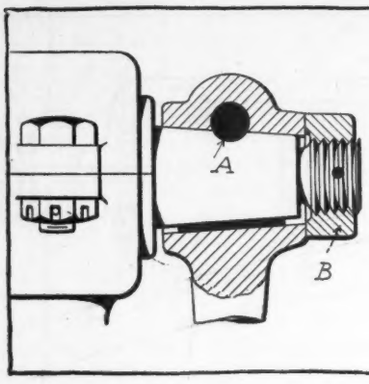


FIG. 11—TAPER CLAMPED HELD BY NUT

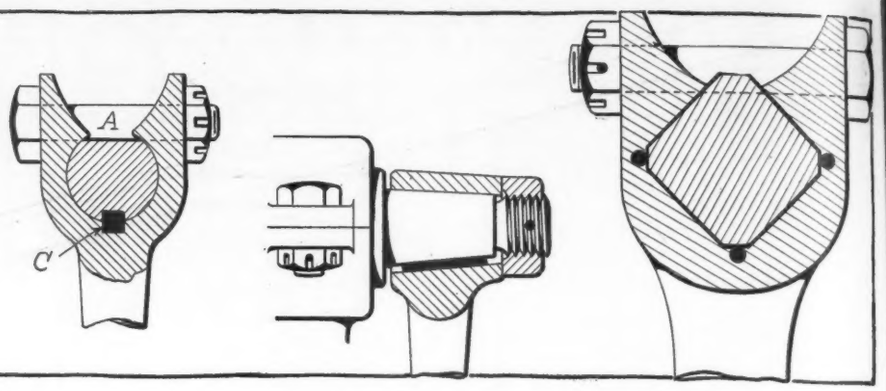


FIG. 12—TAPER AND NUT ON SQUARE SHANK

this plan is also very secure, but it is harder to fit assuming that the surfaces are to be in good contact for the entire axle length. This idea is also with levers of great responsibility, and is much in use. Fig. 13 gives the relations of the controlling parts as they are placed to serve the driver of a car, and although there are divers modifications of the plan shown, the dominant idea is convenience. Slowly but surely standards are being fixed upon, and the control levers should ultimately be standardized.

Fig. 14 is of a linkage with universal joints of the ball-and-socket type, using steel tubing for the purpose. This idea is worthy of much confidence and as the drawing shows means are provided for disposing of lost motion, although a ball joint offers the most surface and is the least likely to wear. Clamping bolts with pinned nuts prevent the parts from backing off. Fig. 15 shows how it is possible to avoid the use of joints, which on small parts are prone to go adrift and cost more than is reasonable in many cases. If suitable material is used there is no reason why the shaft should not be formed to serve as a lever in the manner as shown and the process of die-forging is available for this class of work. Fig. 16 illustrates a locking device for a needle valve adjustment sometimes used on carbureters, and as a rule the spring lock gives more trouble than it is worth. This is due to the absence of sufficient length of the spring, and in the illustration an attempt is made to indicate a sufficient length of spring to answer the purpose.

(To be continued.)

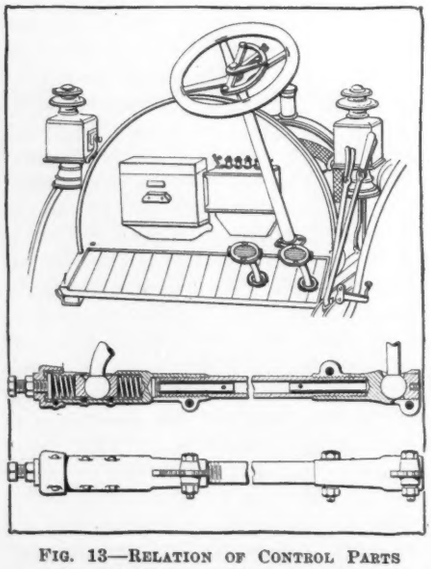


FIG. 13—RELATION OF CONTROL PARTS
FIG. 14—BALL-AND-SOCKET LINKAGE

Manufacturers' Communications

WANTS HARDER GLIDDEN TOUR

Tarrytown, N. Y.—Editor Motor Age—Now that the Glidden tour is over and the manufacturers and contestants have had an opportunity to view the event from a commercial as well as a sporting standpoint, they cannot help but arrive at two conclusions. First, that the tour was a great success in the development of the business in the section of the country through which it passed and should be repeated, and secondly, that for the coming season the rules covering the run should be more strictly and scientifically drawn than they were this year. For instance, in this year's run, cars made a perfect score and yet experienced considerable difficulty; as there were no penalizations made for adjustment of carbureters, ignition troubles, oiling or adjustment of brakes and cars were allowed to be towed, which was done by fourteen of the entrants, including some six-cylinder cars and prize winners. Had the rules this year taken these matters into consideration there would be a very different ranking of the cars at the end of the run. We believe that ignition trouble to the average motorist is one of the most serious difficulties they may experience and one which is the cause of more stoppages and trouble than any other one thing. While undoubtedly the oiling system is of the utmost importance to the entire life of a car, and any event of the nature such as the Glidden tour should put the oiling system to the severest test. Dependable brakes of long service is what every motorist wants and that a perfect-score car could go through making frequent adjustments to their brakes without penalization, we do not feel is just as the thing should be. Without detracting from the splendid performance which the perfect-score cars did make, we cannot help but wonder what the result would have been had the rules been drawn up in a more technical way and with less favoritism to the large cars.

Our own entries which won class D, cars selling from $1,000 to $1,750, were lost sight of in the placing of the final rewards, and the public was made to feel that nothing but the high-powered and expensive cars were capable of winning such an event. Whereas our cars made the entire run without an adjustment of the carbureter, ignition or oiling system, and it was not necessary to even tighten the brakes, and we were not towed up any hills. The light weight of the cars reduced tire troubles to a minimum, having only two punctures, the same casings carrying the cars through the entire trip.

Hoping that next year Motor Age will use its influence to make the run even more strenuous than it was this year, a trip from the Atlantic to the Pacific, we believe, being the most advisable, and that the rules be gotten up in a way that would give the lower-priced cars equal advantage with the high-priced ones.—C. W. Kelsey.

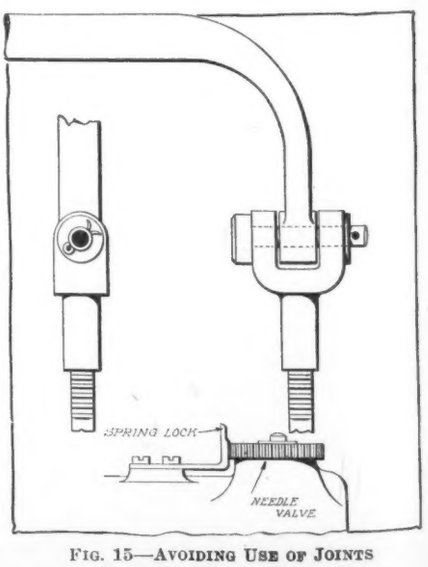


FIG. 15—AVOIDING USE OF JOINTS
FIG. 16—NEEDLE VALVE LOCK

The Motor Car Repair Shop

REMOVING STUCK PISTON

IN a recent issue of Motor Age a means was asked for removing a piston which had been shoved too far into the cylinder, thereby allowing the first ring to pass a shoulder in the combustion chamber, whence it expanded and prevented the piston's removal. Since the publication of this dilemma numerous inquiries have been made and several suggestions have been ventured by readers of Motor Age and technical editors of other journals. One method advanced was to fill the combustion chamber with water, then apply air pressure through the priming-cock, or spark-plug hole; the theory being that the pressure so applied would force the ring back into its groove. This theory, of course, is quite unsound and impracticable, because even if the inside edges of the ring were not exposed, the opening at the slot would allow the water to get in back of the ring and render the pressure ineffective.

Another scheme, one in which magnetism is the agent used, is furnished by an eastern critic, who says: "With an iron or steel shaft, the former preferred, about 1½ inches in diameter as a core, and using No. 16 or 18 covered wire, wind a coil of six or eight layers, the coil to be about 8 inches long and one end flush with the end of the core. Stand the cylinder on end with the coil inside, making sure that the core is in good magnetic contact with the piston, but separated from the cylinder walls. Switch a current on and off in the coil, at the same time working the piston up and down with the connecting rod and, unless the rings are very strong, the magnetism may be sufficient to contract them so they will enter the cylinder grooves. The connecting rod might be used as a core, but for the fact that the bearing at the piston end is doubtless non-magnetic metal. The size of the wire in the coil may vary somewhat, but the current used should be as heavy as the size of the wire will permit."

This is more plausible than the first suggestion, but also savors of the impractical, because in case it were possible to magnetize the piston without also magnetizing the cylinder, the tendency would be to draw the ring to the nearest point of contact, which would be the top or bottom of the groove, and not into it. However, impossible as the above modes may be, each contains a different line of thought and brings into play a valuable and commonly-used scientific principle whose use is often overlooked by the mechanic, and which it is hoped may be successfully employed in some similar way by readers of Motor Age. In Fig. 1 is a sectional drawing of a cylinder showing

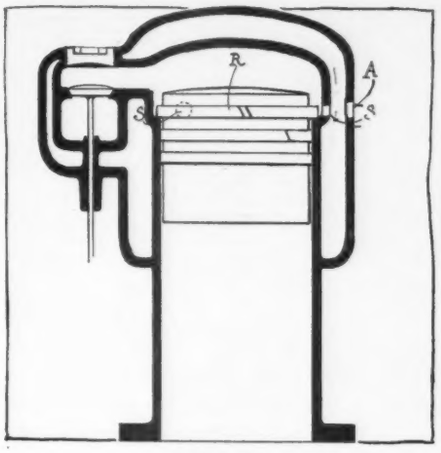


FIG. 1

how the piston is stuck; the bottom edges of the top ring R resting against the shoulder S all around the circumference. Now if a hole about ½ inch in diameter were drilled through the cylinder at A so that a piece of wire or flexible flat steel, such as used in steel measuring tape, could be slipped around the ring, it could be pulled together and the piston removed; or, if three holes were drilled, as near 120 degrees apart as possible, pressure could be brought to bear upon the ring in this wise. After the piston is removed the holes could be carefully tapped and plugged, and with a little paste made of litharge and glycerine applied to the plugs before they are screwed into place, the cylinder would again be ready for use. To facilitate manipulation of the piston ring, and the fitting of the plugs, it might be advisable to make the hole penetrating the outside wall of the waterjacket about ¼ of an inch larger than the inner one.

HEAT SOLVED THE PROBLEM

A problem which taxed the diagnostic powers of several experts was recently solved in a repair shop in Chicago. The crankshaft of a foreign car of prominent make had been broken, and the flywheel

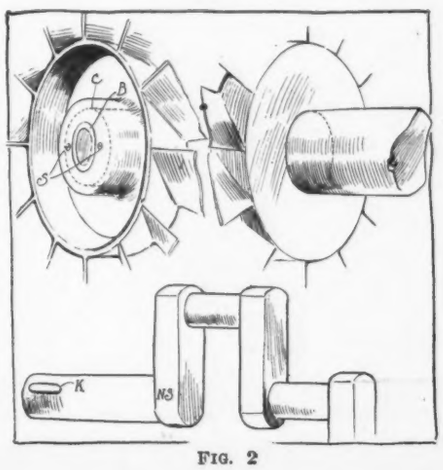


FIG. 2

with a part of the broken shaft attached thereto was brought to the repair shop together with the new shaft. As shown in Fig. 2, the end of the new shaft NS, designed to fit into the hub of the flywheel, contained a key K. In the same illustration are two views of the flywheel with the broken shaft intact. B is the bushing in which the end of the clutch-shaft rested, the dotted line C representing the size of the end of the crankshaft; the object of the set screws S, which were about 1 inch long, was unknown; no other lines could be found. Now, as there was no sign of a keyway on either side of the hub, the question was: How was the shaft put into the flywheel. On the belief that there was a cap on the end of the hub attempts had been made to remove the same with a cold chisel and a hammer; this had no more effect than the burring up of the hub. It was then suggested that a wheel puller be applied, but, fearing to break the flywheel, this means was not tried. At last it was concluded that the screws S were for no other purpose than to secure the shaft, which had either been shrunk or pressed into place. This proved to be correct, for after setting the outfit over the forge for a few minutes the steel shaft almost dropped out of the wheel. A keyway was then cut in the flywheel and the new shaft put in.

HINTS FOR AMATEUR REPAIRMEN

Don't try to screw a nut down too tight, you are liable to strip the thread. In tightening the nuts which hold down the cylinders, or secure the bottom half of the crankcase to the upper half, or in any case where several nuts and studs are employed, be sure that a good firm contact is obtained between the surfaces to be drawn together before the nuts are drawn up. The nuts should be drawn up evenly all around. Don't draw one nut down tight, then proceed to the next one, for if you do the chances are that you will break off a lug. When packing is used, paste it to one half—the stationary part preferred—using shellac when the connection must be oil-tight and white lead where a water-tight union is desired. A fold in the packing when the parts are drawn up tight will be the cause of a broken case or cylinder, or at least a leaky joint. Don't use a pipe wrench or a pair of pliers to tighten a nut if a plain jaw wrench is at hand, and avoid the use of a wrench whose jaws are too large to fit the nut. In making a gasket for a flange on the water, or gas piping, be sure to cut out the hole in the middle; blind gaskets are very detrimental to the successful operation of a motor. Whatever you do go easy, and try to make up your mind why and how you are going to do it.

MOTOR CAR DEVELOPMENT

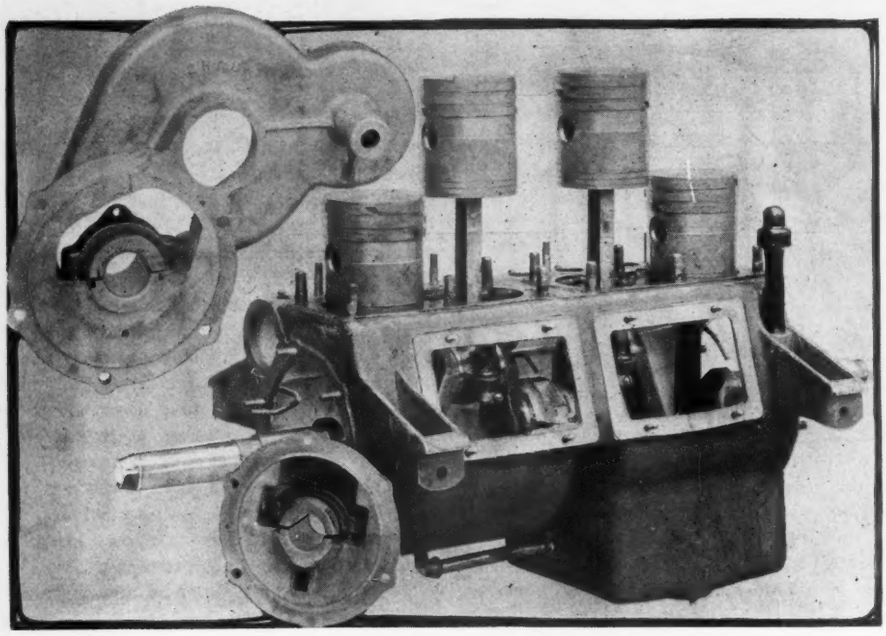


FIG. 1—REO FOUR-CYLINDER MOTOR PARTLY ASSEMBLED

NO MORE interesting announcement regarding 1910 cars has been made than that of the Reo Motor Car Co., Lansing, Mich., regarding its four-cylinder car, which it will market next year. The Reo concern has been the most consistent exponent of the two-cylinder construction since its entry into the motor car field, and the marketing of a four-cylinder car at little over the price of the two-cylinder is creating a great deal of interest. The new four-cylinder Reo, which has been designated model R, has twin cylinder castings, the cylinders having 4-inch bore and 4½-inch stroke and which is rated at 30-35-horsepower, but which, according to A. L. A. M. formula will have a 25.6 rating. The new Reo has, in addition to the four cylinders, many points of interest in connection with it. Foremost comes the left-hand steering control, which is in keeping with the growing tendency in this country. Second comes the use of three-quarter elliptic rear springs, now being adopted on many of the highest priced cars, and in conjunction with which is the dropping of the frame in front of the rear axle, which permits of the use of three-quarter springs and yet allows of the motor and transmission being carried particularly low. The car is a shaft-drive construction, and transmits the power from the motor through a multiple disk clutch contained in an oil-tight compartment in the flywheel, and a three-speed selective gearset. Internal and external brakes are fitted on the rear wheels, the front axle is an I-beam forging, and the body is a five-passenger one.

These are not a few points of interest about the Reo motor, chief among which is the valve situation, with the inlets directly in the cylinder heads, whereas the exhausts are in bottom of ports on the right side. This valve arrangement allows of opening the exhaust by direct lift and operating the intakes through rocker arms, so that only one camshaft is needed, this being incorporated in the crankcase at the right side. All of the valve lifters are adjustable and have fiber inserts to reduce the noise. Both intakes and exhaust valves are of the bevel-seated type, having nickel steel heads electrically welded to the stems. The feature of the motor and one illustrated in Fig. 1 is the one-piece crankcase with two large openings on the right side through which access is possible to adjust the lower bearings of the connecting rods. The forward half of the crankcase has an oil reservoir cast integrally with it which carries the oil supply for the circulating lubrication system. Using a one-piece crankcase necessitates supporting the end bearings of the crankshaft in end plates, which allows of these bearings being adjusted from the outside

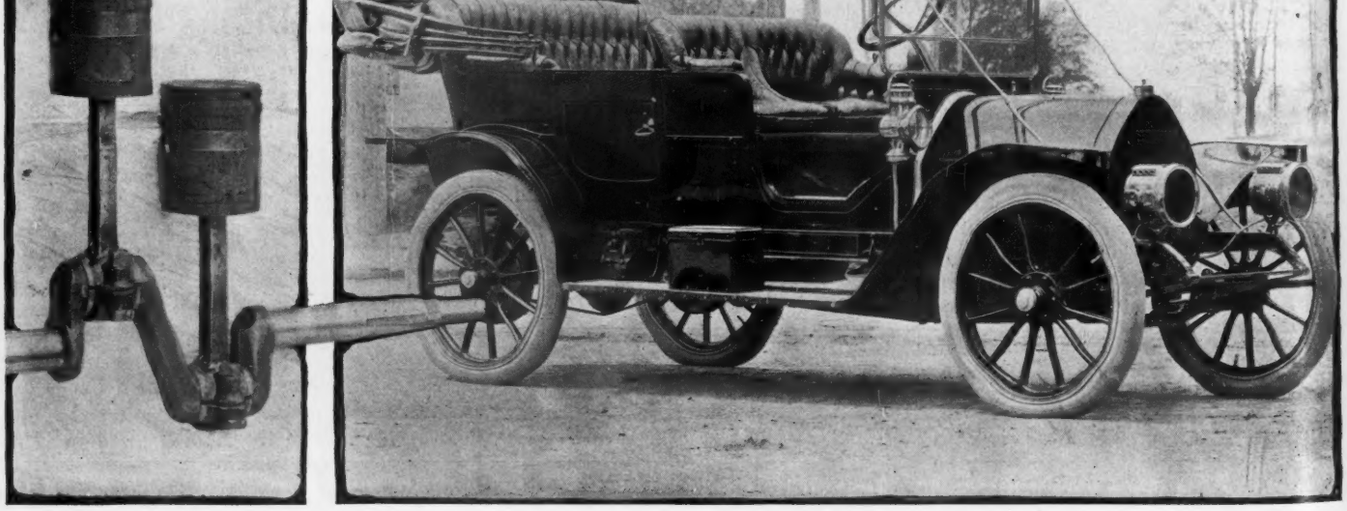


FIG. 2—REO POWER CONNECTING ROD BEARINGS AND 1910 REO TOURING CAR

MODEL R FOUR-CYLINDER REO

of the crankcase, the claim being that these can be adjusted in not over ½ hour. The crankshaft is a manganese steel forging with a tensile strength of 110,000 pounds to the square inch, and has 10½ inches bearing length in the three bearings with 1½-inch diameter in all of these, as well as for the four connecting rods. A practice followed in this motor, and one which has many followers in this country and abroad, is offsetting the crankshaft from the center line of the cylinders, so that on the explosion down stroke of the piston the angularity of the connecting rod is less than were the crankshaft bearings located in the center plane of the cylinder. But the Reo company has gone further and offsets the camshaft from the center line of the valve plunger guides, so as to avoid side thrust of the valve lifters. The camshaft runs on three bronze bearings and the timing gears are spirally cut and operate in a bath of oil constantly replenished from the motor lubricating system. Pistons carry three split compression rings above the wristpin and three oil grooves at the lower end, and a special pinching block with set screw is used on the bolts holding the connecting rod in place, this locking arrangement being well adapted for adjustment through the openings in the side of the crankcase.

The oiling system of the motor is of paramount importance. As already stated, the oil supply is carried in a reservoir or sump beneath the forward part of the crankcase and a plunger pump driven by eccentric from the camshaft elevates the oil from this reservoir to the three bearings of the crankshaft and also to the face of the timing gear. This oil collects in partition reservoirs in the base of the crankcase and is maintained at a constant level, the connecting rods dipping into this supply and furnishing a splash system for the cylinder walls and pistons. In the bottom of each cylinder is a baffle plate which regulates the amount of splash which reaches the cylinder walls, this plate being used to avoid excess of oil in the cylinders and consequent fouling of the spark plugs. The oil reservoir in the motor has capacity for 3 quarts, which should be sufficient for 250 or 300 miles. In this oiling system there is not a single exterior pipe. Much attention has been given to prevent the leakage of oil from motor parts. The first example is the fitting of return oil leads from the end bearings of the crankshaft, by which oil is returned from the outer ends of these bearings to the crankcase. Another example is the valve plunger guides have recesses at the top for collecting oil and returning it to the case; and a further precaution has been taken to fit protection caps to keep dirt out and keep the oil in. Only one grease cup is used on the motor, and that is located on the fanshaft.

The ignition system is a regularly fitted magneto with battery for starting.

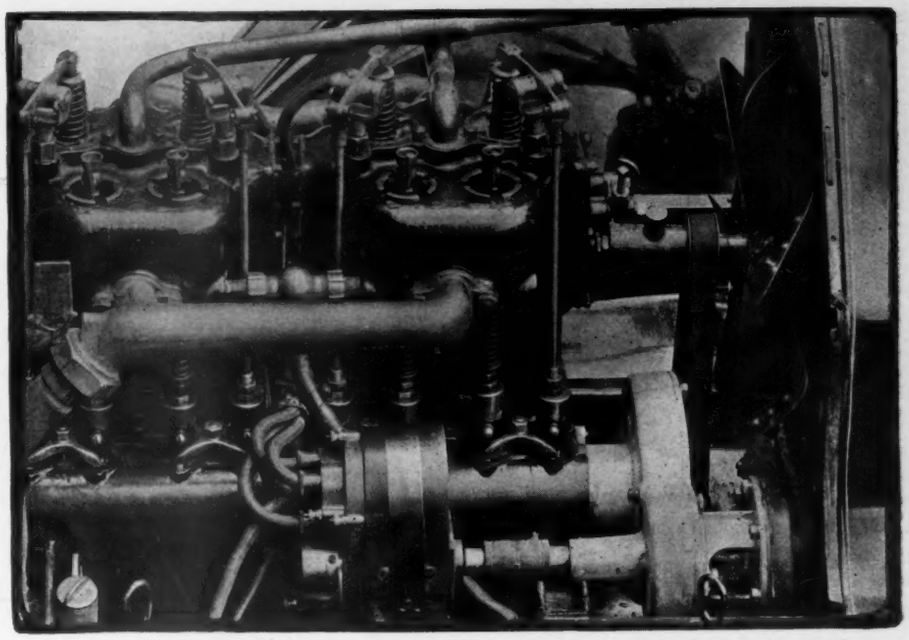


FIG. 3—THE MAGNETO IS REGULARLY FITTED ON MODEL R REO

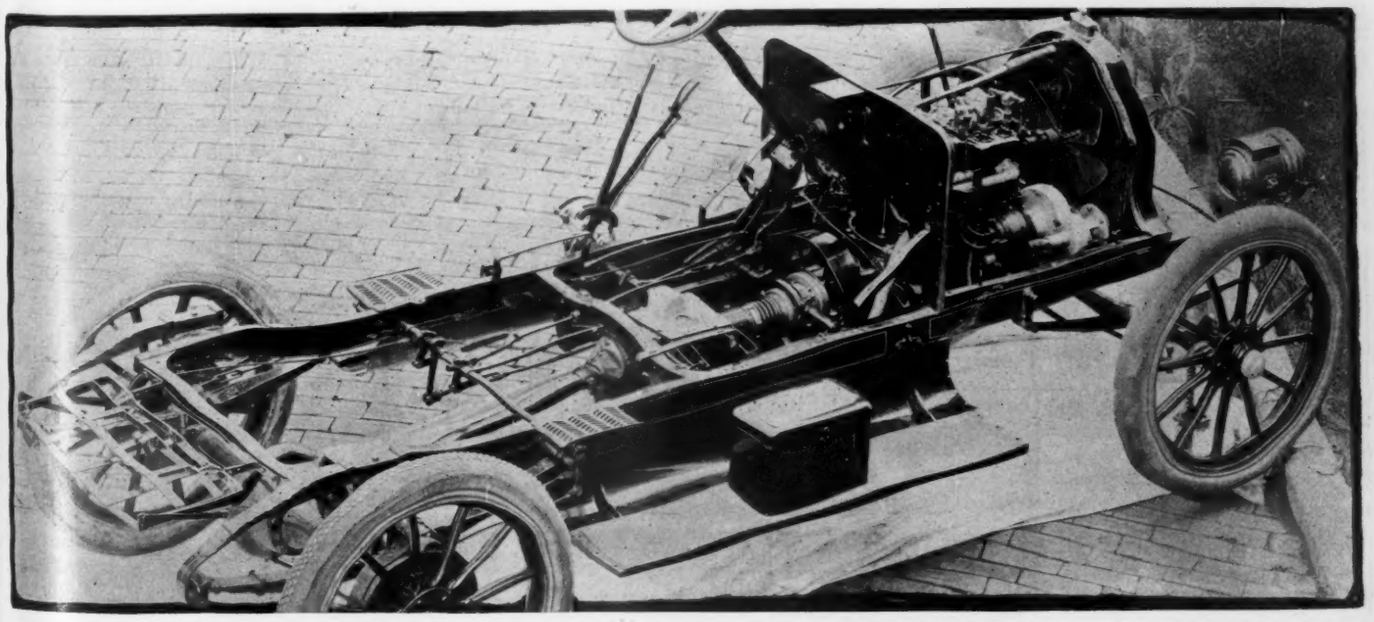


FIG. 4—REO CHASSIS SHOWING TUBULAR TORSION ROD SUPPORTED FROM GEARBOX

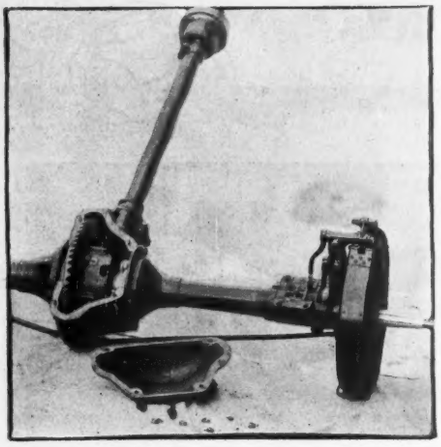


FIG. 5—REO SEMI-FLOATING REAR AXLE

A conventional cooling system is employed on this motor. A centrifugal water pump for the magneto shaft maintains the circulation. Back of the radiator is a ball-bearing fan driven by ⅞-inch flat endless belt provided with adjustment. Additional cooling measures are afforded by the flywheel, which is formed with propellor blade spokes between the clutch casing and the rim. The radiator employed is of the vertical flat tube variety, the same as used heretofore on Reos and which admits of repairing without difficulty.

The Reo clutch, illustrated in Fig. 7, is a typical multi-disk type with the disks engaged by a single spring S and with them enclosed in a compartment in the flywheel F. Back of the clutch is a universal joint C with a cross T at each end, at right angles to each other. This construction gives a complete universal action and all of the parts are inclosed and packed in grease. In disengaging the clutch, dragging is avoided in that there is a positive release which separates the plates. The disks are of hardened steel and phosphose bronze, one set attached to the flywheel and the other to a short transmission shaft. The steel disks are ground and afterwards hardened.

Nothing out of the ordinary appears in the three-speed Reo selective gearset, Fig. 11. The mainshaft has four integral feathers K on which move the two sliding units A and B. For direct drive the unit B engages through end teeth with the pinion C on the short shaft CF. On the countershaft are the usual gears, F, E and D, held in position by spacing sleeves. Both shafts are carried on adjustable ball bearings and the short clutch shaft CS is supported on a double race of bearings. As is usual this shaft is hollowed at its rear end where it takes the forward end of the mainshaft, and forms a bearing for it. Gears in this set are of six pitch and ⅞-inch face. The case is a one-piece casting with removable end plates for supporting the bearings of the shaft, and a large cover plate.

Closely associated with the Reo transmission and clutch is the semi-floating rear axle system, in which the propellor shaft is inclosed in a tubular housing which plays the role of a torsion tube. This construction allows of but one universal joint between the gearset and the back axle, and this is inclosed in a spherical steel casing which forms the upper end of the torsion tube. This spherical casing is inclosed in a split bronze ring which slides in a pressed steel casing bolted to the transmission case, and not a cross member of the frame as is the case with many cars. The propellor shaft is 3½ per cent nickel steel and runs on adjustable bearings in the torsion tube. In the rear axle the differential is mounted on adjustable ball bearings and the outer end of the axles, as shown in Fig. 8, are carried on Hyatt roller bearings H, these bearings running in a steel sleeve inserted in the axle tubing. A standard gear reduction of 3½ to 1 is used. Special attention has been given to the adjustment of the bearings, those in the torsion tube being adjustable from the outside and those in the differential may be adjusted by removing the cover.

The two sets of brakes used on the rear wheels are operated on the same 14-inch drums D, Fig. 8. The forward axle is a one-piece forging with integral spring seatings. The frame is hot riveted and has a subframe for carrying the motor and transmission, this being placed at a slight angle to the main frame in order to give a straight line drive. The steering gear, Figs. 9 and 10, is of the pinion-and-sector variety, there being a pinion P on the bottom of the column C. The pinion meshes with the sector S, which is on the radius arm axle, a bracket B supports the steering gear on the frame. Spark and throttle S and T are on the side of the column. Bronze bushings are used through-

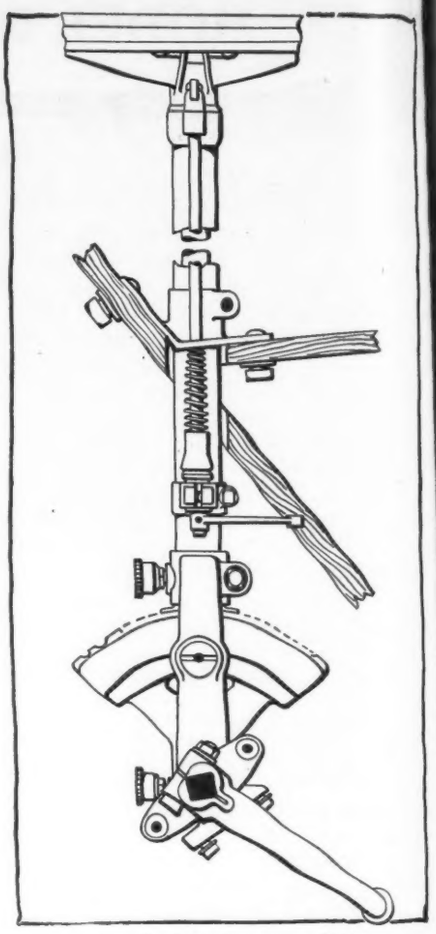


FIG. 9—REO STEERING GEAR

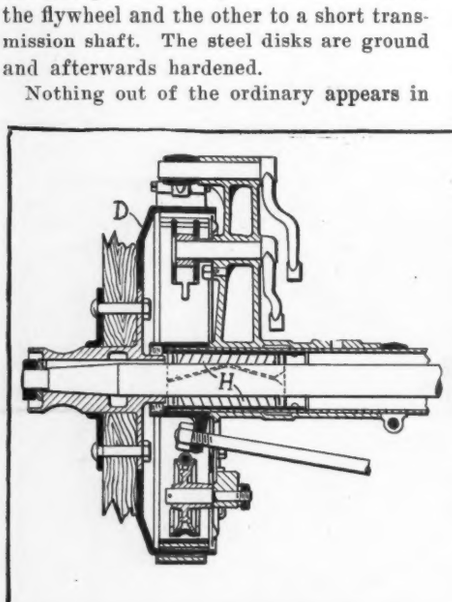


FIG. 8—REO AXLE BEARING

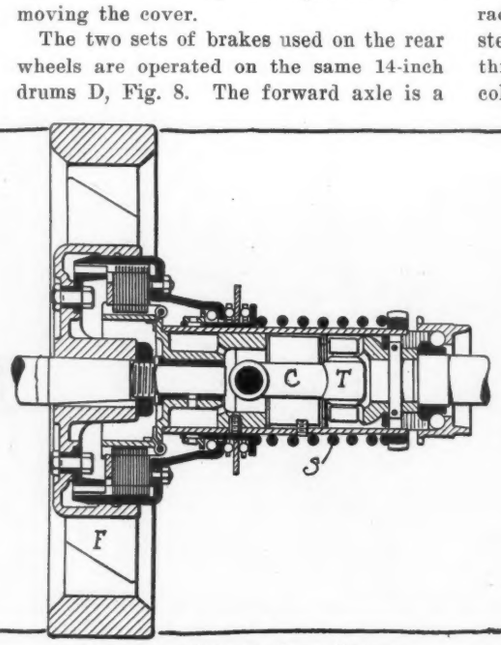


FIG. 7—REO MULTIPLE-DISK CLUTCH

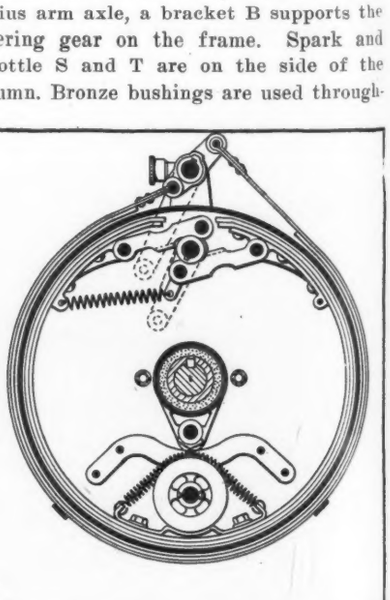


FIG. 6—DOUBLE REO BRAKES

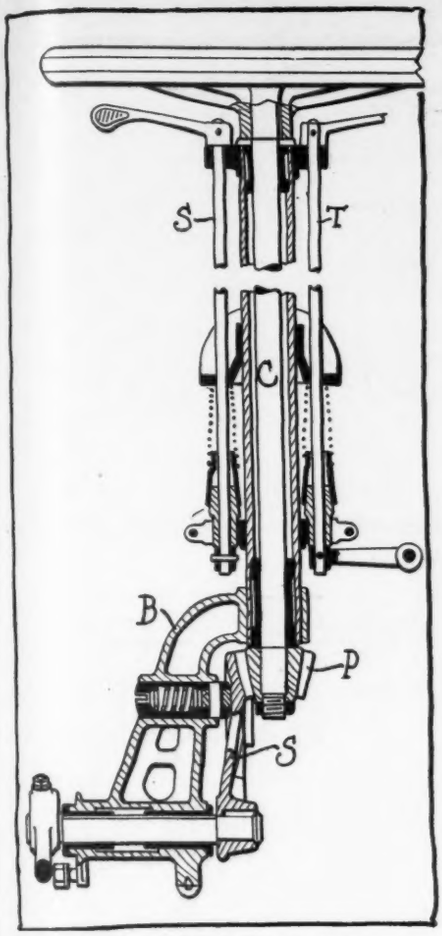


FIG. 10—REO STEERING GEAR

out for bearing purposes on this steering gear, grease cups are fitted at every wearing point, and the steering connections are carried above the axle. The steering wheel is 16 inches in diameter and is a hard rubber rim carried on an aluminum spider, the ring having molded finger grips to prevent slipping of the hand.

Like all other cars with left-hand control, it is necesasry to operate the emergency brake and change-speed levers with the left hand. As in right-hand control, the brake lever is on the outside. This lever operates the external brakes and when these are applied the clutch is disengaged. There are two pedals, the right one controlling the external brakes and the left one operating the clutch. The car body is of the tonneau type with rear seat 48 inches wide on the inside and 40-inch front seat, semi-divided. The car is fitted with 34 by 3½-inch quick detachable tires.

CARE OF VEHICLE BATTERIES

(Continued from page 25.)

all into trouble because we will forget to use the hydrometer. There is another thing. Suppose the hand has come back to zero and you think it needs charging. There may be battery charges that give 60 per cent of the rate capacity. Suppose by using the ampere-hour meter it has given you 60 per cent. You find you will be 40 per cent shy in case the battery has had something happen to it and given it only 60 initial capacity. I do not think the ampere-hour meter is going to do any good at all. I think it will add complications and give people more things to worry about."

Mr. Bentley said: "Possibly I may take exception to one or two of Mr. Newman's assertions on the ampere-hour meter and its benefit for commercial vehicles. Mr. Newman suggests the specific gravity test as being the proper one to take. Of course it is a good test, but it inevitably consumes considerable time, even if the battery could be put in accessible place. It is not an easy thing to design, in a commercial way, a battery to permit getting at the cells for a gravity test. If you did take it, you might say you would take it in one cell. That would give you no better criterion of the battery as a whole than you would have from the appearance of the ampere-hour meter. The point Mr. Lunn made with regard to the tendency of the driver to depreciate the mileage he can make and say he is in bad condition when he does not want to go out in the last hour or two in the afternoon is very important, and I think it has been found and proven in installations of this

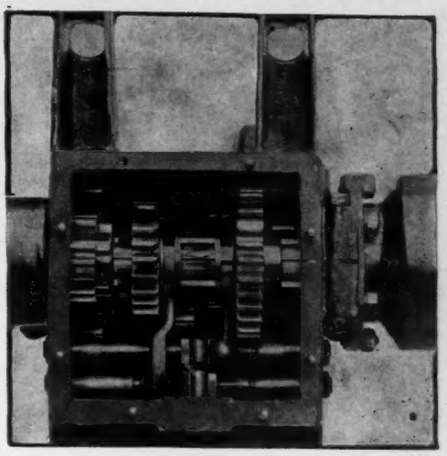


FIG. 12—REO SELECTIVE GEARSET

comparatively recent meter which can be put into a commercial wagon and which can be expected to operate with a fair degree of accuracy, that the mileage that the commercial vehicle makes can be increased by—well, I might say almost 100 per cent, due to the action of the driver. Of course there is always a possibility if you keep your machine in a public garage and the garage man wants to get the better of you in the charging he might be able to get the better of the ampere-hour meter. On the other hand, it might be easy to lock this machine so it could not be tampered with—rather easier than any other arrangement. Of course, his giving you the discharge reading every time on your battery, it will protect you fairly well from having one that is, say, of 60 per cent efficiency instead of 100 per cent efficiency, because you will know from one time to the next what its efficiency is, and it is not at all an unlikely thing that anything other than a mechanical defect of a jar will affect its discharge from one time to the next. If you have gone out 1 day and have gone 100 per cent or 90 per cent of what you can expect, you can be pretty safe in doing it the next day. Of course a voltmeter reading is something that is rather difficult for the average person unaccustomed to batteries to interpret."

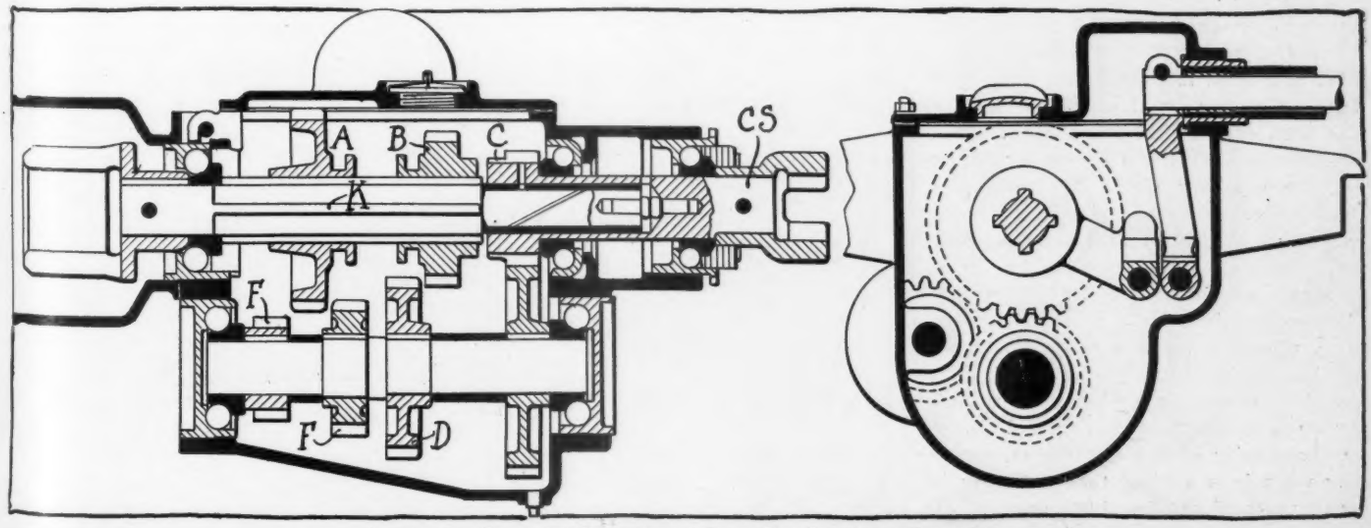
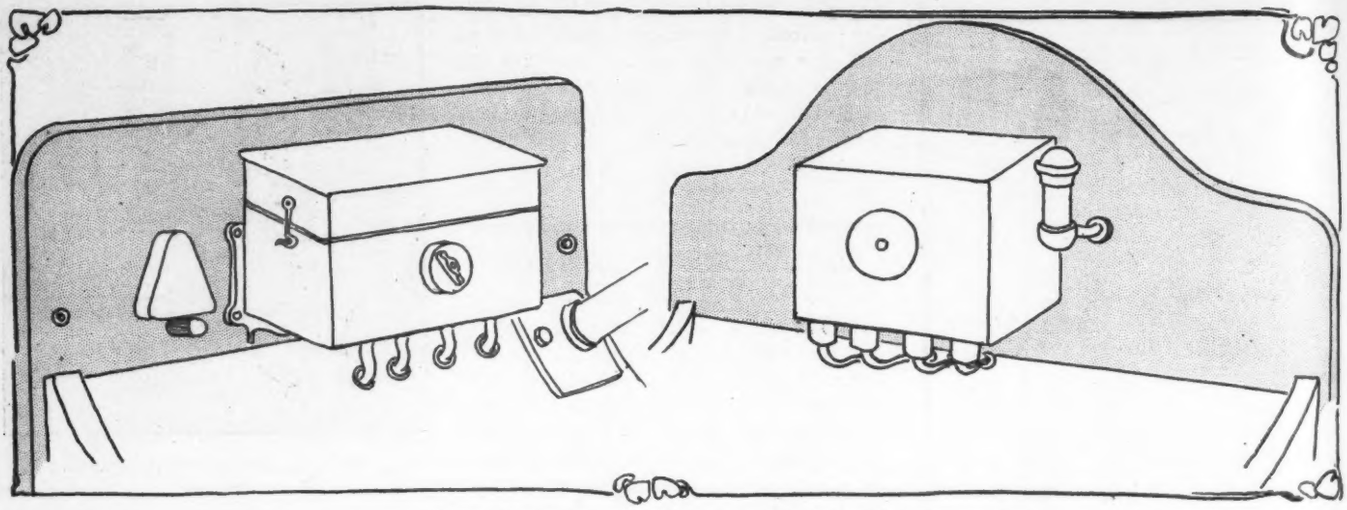
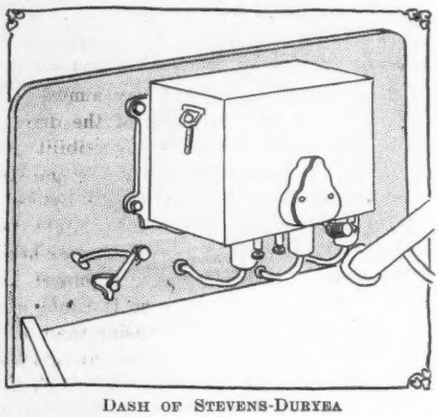


FIG. 11—SIDE AND END ELEVATION OF REO SELECTIVE GEARSET



DASH ARRANGEMENTS OF RAMBLER AND CHALMERS-DETROIT CARS



DASH OF STEVENS-DURYEA

Simplicity Characterizes

Good Dashes An Aid The Car Owners

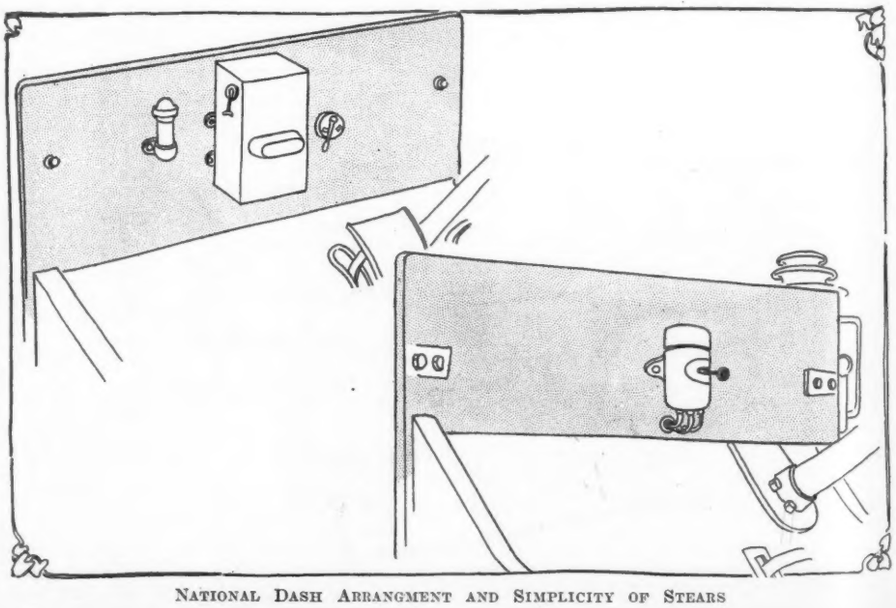
AS there has been but few radical changes in motor car construction this year, the common tendency has been toward the perfection of those features which tests and time have found wanting, and toward the general improvement and refinement of the entire car, with much attention to the arrangement and location of its accessories. In this wave of improvement a feature that has come in for no small share of consideration has been that of clearing from the dash all unnecessary and misplaced parts.

From this one must not infer that the entire movement has been toward elimination, for, although some manufacturers have succeeded in clearing the dash of all but one or two small contrivances, there has been one marked addition, or rather replacement. This is a device for adjusting the auxiliary air of the carbureter. Whether or not this equipment is necessary is a question that has been fairly well thrashed out in favor of the device. It stands to reason that if adjustment of the needle valve of a carbureter is necessary, whenever there is a change in the specific gravity of the gasoline used, there certainly should be a change in the air supply whenever there is a marked change in the density of the atmosphere, especially when it is realized that for every 15 or 20 parts of gasoline 1,000 parts of air are necessary for a proper mixture. Therefore, granted that adjustment is necessary with every decided change in the weather, is it not better to supply a regulating device, in a convenient location, with instructions as to its use, which may be so designed that any novice can adjust his carbureter as much as he pleases without doing any particular damage?

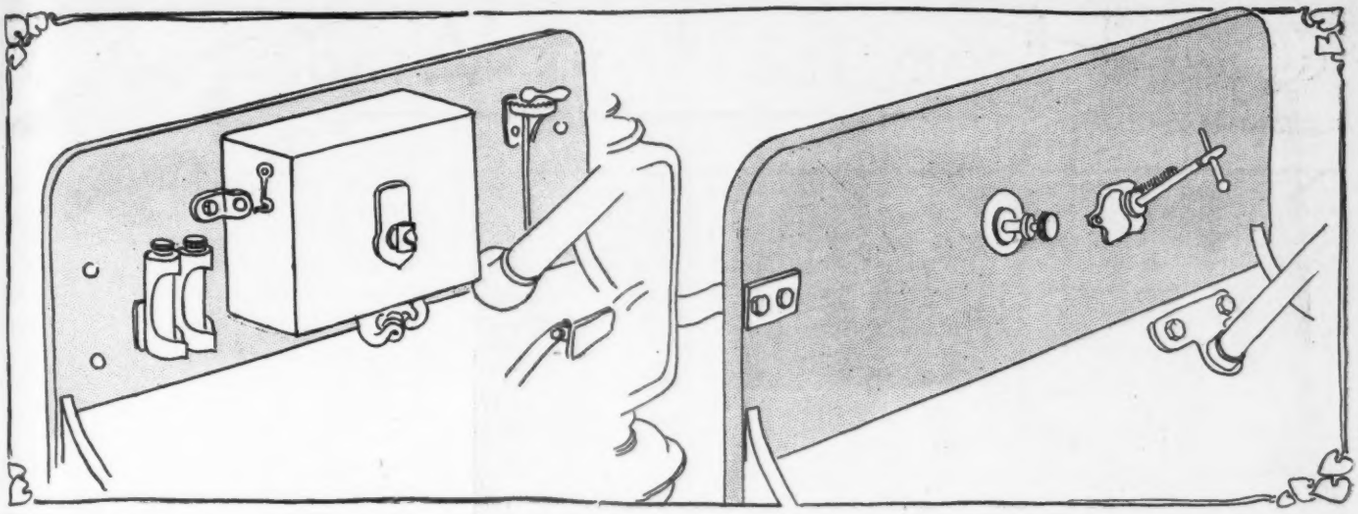
The disposition on the part of some makers of surrounding their carbureters in a veil of mystery is absurd. If simple and explicit instructions as to the adjustment of the carbureter were given to the driver of every car there would be less carbureter trouble. It does not take a person long to learn when his motor is doing its best; and no driver with any pride in his mechanical ability will take his car to the agency or repairman to have his carbureter adjusted whenever it is effected by changes in the weather or gasoline, or an accumulation of dirt or water.

Mechanical oilers, whose location on the dash in previous years made it difficult to sit in the front seat of a car without soiling one's clothing, have, in nearly all cases, been placed out of sight under the hood, where a stable fluidity of the oil is maintained by the heat of the motor and their operation facilitated, so all there is to be seen of the oiler on the dash—in some cases—one or two small oil gauges which are clean and neat. In many instances not a sign of a lubricating system is to be seen on the dash.

Some manufacturers who are using ignition systems without unit or multi-unit induction coils have succeeded in clearing the dash almost entirely. Studebaker and Gaeth cars, as shown, are probably the best examples of the clear dash idea. In the case of the Studebaker the only device on the dash is the small push rod for short-circuiting the magneto. This is placed near the footboard, so that it is



NATIONAL DASH ARRANGMENT AND SIMPLICITY OF STEARS



PACKARD AND FRANKLIN DASH FITTINGS

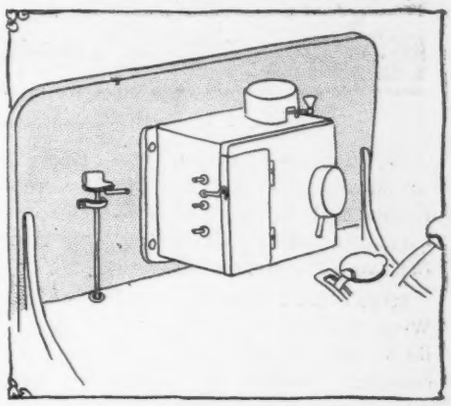
Motor Car Dash Design

To Motoring and Give Many Comforts

only necessary to apply a little foot-pressure on the button to stop the motor. On the Gaeth the only accessory visible is a two-way switch. The designers of these two cars might have made the job complete by placing their switches on the footboard, or in some other convenient place. The Stearns dash is quite clear except for a combination unit coil and switch used with the Bosch dual ignition system; and the National has a unit coil in the center, an oil gauge at the left, and a magneto switch at the right. One illustration shows the arrangement of dash fittings on Packard and Franklin cars. The Packard has a double coil in the center with a two-way switch on the coil box; on the left there are two sights to show that oil is circulating, and on the right a lever on a sector for adjusting the auxiliary air to the carbureter. The Franklin dash is quite clear, the object in the center being a pushrod for shortening the magneto, and the device at the right a carbureter adjustment.

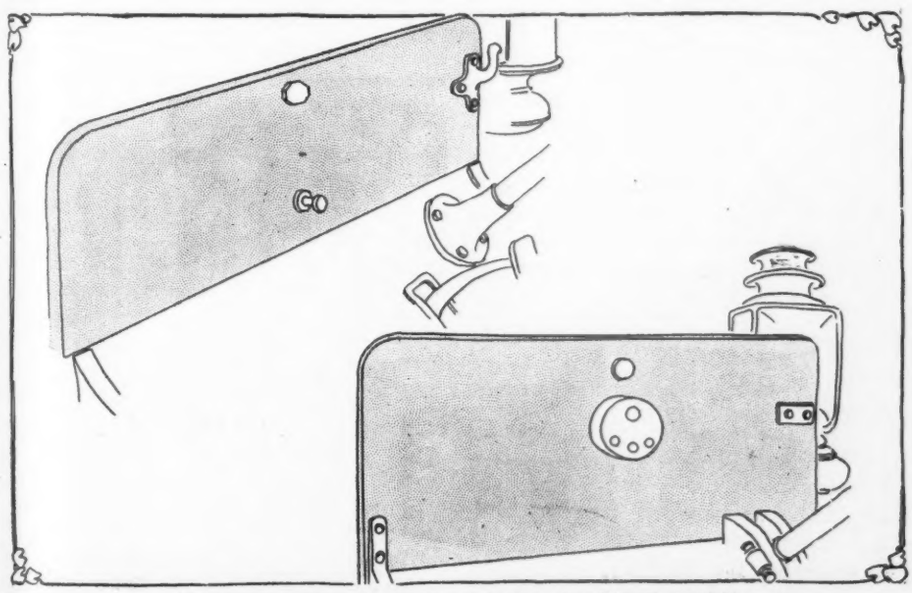
Chalmers-Detroit and Rambler dashes are shown. The Rambler, having two independent ignition systems, has a multiple unit coil a little to the right of center and a magneto switch to the left of the coil. The Chalmers has a four-unit coil in the center with an oil gauge to the right of the coil. On the Elmore an Atwater-Kent ignition outfit is on the dash, with a device for adjusting the auxiliary to the carbureter at its left. This arrangement greatly resembles that of the Stevens-Duryea company, which has a multiple-coil in the center, with an air-adjusting device also at the left, but a little lower down.

One of the noted improvements of the year, particularly on runabout and roadster models, is the inclosing of the dash to afford more adequate protection for the driver. In wet weather the ordinary straight dash does not offer the slightest protection in that it is too low as compared with the seat. On roadster cars this is entirely changed because of the greater rake on the steering column and the lower position of the seats. The comfort of these types of cars is additionally increased by the hooded dash employed, which frequently extends well back. In one or two cases now designated as extreme the dash hood is continued back more than 2 feet and comes close up to the steering wheel. This, together with leather side guards which button on the dash and extend to the ends of the front seat, offer the very best protection possible. This is a sensible construction and will not in any wise be considered extreme next season.



ELMORE DASH ARRANGEMENT

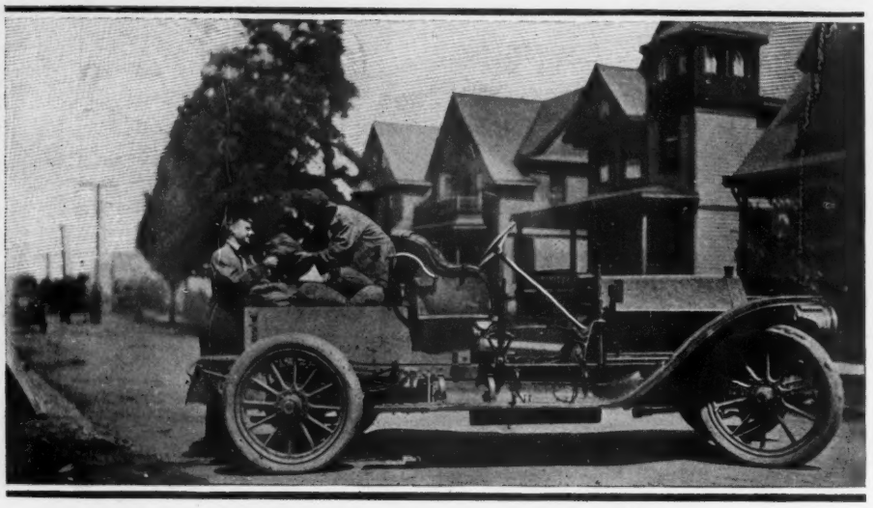
The motor car is a means of transportation and comfort is one of the great essentials of travel. There is no necessity of being exposed to rainstorms when a little extra design consisting of a well-hooded dash, side curtains, and sloping base of wind shield, will give the desired protection. This design is one reason for the popularity for roadster cars for winter use and is a most considerable one. With touring cars the same results can be accomplished and have been well worked out in the Prince Henry tour of this year recently held in Germany.



NEATNESS A FEATURE OF STUDEBAKER AND GAETH DASHES

From the Four Winds

N S E W



STEARNS CHASSIS LOADED WITH SAND AND READY FOR A ROAD TEST

Is an Object Lesson—The Titusville Automobile Club and the Oil City Automobile Club are improving at their own expense a road 24 miles long, connecting the two Pennsylvania cities.

Must Blind Lights—The city of Neenah, Wis., will prohibit interurban electric lines from running over the streets without covering headlights. Motorists have made many complaints that the glare is dangerous and that several collisions have narrowly been avoided because of the blinding light.

Another Columbus Meet—The racing committee of the Columbus Automobile Club, of Columbus, O., is busy arranging for the September racing meet to be held at the Columbus driving park, which track is considered one of the best in the country. The meet will be held late in the month, and one of the features will be a 24-hour race.

Philadelphia's Next Meet—Robertson, Florida, de Palma and Poole are on the cards to drive at next Saturday's midsummer meet at Point Breeze track, Philadelphia. The quartet will all contest in the Point Breeze marathon at 50 miles, and some of them are entered in the shorter races. Robertson will drive the new 60-horsepower Haupt in the big race and the Simplex 50 in the shorter events.

Seattle's Carnival Plans—Voting for the queen of the motor carnival to be held at the Alaska-Yukon Pacific exposition September 8 to 11 has commenced at the fair. Ballot boxes have been placed inside the exposition gates and each person entering during the month of August will have the right to deposit a vote. The coronation will take place at the exposition after a motor car parade on September 8, in which decorated cars and floats from all of the clubs in the northwest will participate. In the afternoon motor cycle races will be held at the stadium, the track having been recently banked. Motor car races will be held on the 2 ensuing days at the Meadows.

Blow at Taxicabs—Mayor D. S. Rose, of Milwaukee, Wis., has signed and placed in effect the council resolution prohibiting motor cars occupying any portion of Grand avenue or Wisconsin street from Seventh street to Jefferson street longer than to discharge or take on passengers. The resolution is aimed at taxicab and for hire stands.

New State Aid Road—It has been decided that the new state aid road between Orilla, Wash., and Rainier beach will start from Rainier boulevard along the shore of Lake Washington paralleling the old Renton car line through Earlington and then direct to Orilla. The approximate cost of the road will be $12,000 per mile, and the roadway will be 4 miles in length. Sixty-five per cent of the cost will be borne by the state and 20 per cent by the county, and the owners of the property contiguous to the line would be assessed for 15 per cent.

Milwaukee's Sociability Run—Twelve cars participated in the first sociability run of the Milwaukee Automobile Club from Milwaukee to Lake Geneva and return on Saturday and Sunday. The cars started from the public library, Grand avenue and Eighth street, at 3 o'clock Saturday afternoon. Burlington was reached in time for supper, a schedule of 17 miles per hour being maintained. The party arrived at Lake Geneva at 8:15 p. m. Sunday morning the Milwaukeeans were given a ride of 2½ hours on the newspaper boat, which cruises around the lake each morning to supply the resorters with papers. The original schedule was then changed and the party proceeded to Delavan for dinner at the Highland hotel. The return trip was begun after dinner, the route being via Elkhorn, East Troy, Lake Beulah, Mukwanago, Prospect Hill and Milwaukee.

Fighting Dust Evil—The officials of the town of Forestville, Conn., recently purchased twelve barrels of oil for laying the dust of the main highways, which are used to a great extent by motor cars, and the experiment has worked well, the roads so treated now being smooth and hard and practically dustless.

Club at Fremont—About forty owners of Fremont, Neb., have organized the Fremont Automobile Club. An active campaign will be instituted for good roads and the placing of sign boards along the main roads through the county. The following officers have been elected: R. B. Schneider, president; Dr. A. P. Overgaard, vice-president; Dr. E. E. Calkins, secretary; Fred Richards, treasurer; D. V. Stephens, C. H. Christensen, Dr. G. Haslem, board of governors.

Milwaukee's Motor Strength—The tax commissioner of Milwaukee, Wis., announces that there are 1,081 motor cars on the tax rolls for the city, as against 491 in 1908. The value is $634,850, against $250,350 in 1908. As is natural, these figures do not show the real number nor the real value of cars in Milwaukee, it being estimated that there are no fewer than 3,250 cars. It is interesting to note that the number of horse-drawn vehicles of all kinds has decreased more than 10 per cent. The number of horses has decreased proportionately.

Testing Stearns Chassis—Firmly believing that a motor car cannot be too thoroughly tested out before leaving the factory, the F. B. Stearns Co., of Cleveland, has inaugurated a testing system of exceptional severity. Loaded with 1,000 pounds of wet sand, each car is sent at high speed across the rough hill country of northern Ohio for 150 miles. A little over 60 miles from the factory Frank Leland, who is in charge of the work, has established headquarters in a farm house. Here the driver of each car undergoing the road test reports. He is given a certain length of time to make the run and at his arrival at Leland's headquarters he makes a report showing the conditions of the car, the time it took to make the run, etc. At this station Leland has laid in a supply of gasoline, oil, extra tires, etc., so that the testers are able to work independently of the factory. The ½ ton of wet sand carried by the cars is more than equal to the maximum passenger load, as

the sand is a dead weight and in no way eases the car over road bumps and water breakers. The 30-60 horsepower cars carry the 1,000-pound load, while the 15-30 horsepower machines are given 800 pounds.

Club at Titusville—The Titusville Motor Club has been formed at Titusville, Pa., by Axtel J. Boyles and others to carry on an aggressive campaign with a view of getting better roads in Crawford county, Pennsylvania.

Model of Speedway Shown—A model of the Indianapolis motor speedway is being shown in the window of Bertermann brothers, florists, of that city. The track is represented by white sand, around which are located small toy motor cars. Inside of the track real grass appears, while around the outer course are models of the various grand stands.

New Railroad Ruling—Owners of motor cars will be interested in the new regulations recently filed by the Pennsylvania railroad with the public service commission of New York state. The rules prescribe that when assistance is required in loading or unloading less than carload shipments of motor cars, or when such shipments required to be blocked or otherwise secured for transportation, such assistance and material will be furnished at the carrier's expense.

Tips For Tourists—The building of new roads between Avon, N. Y., and Geneseo, N. Y., and Geneseo and Mt. Morris, N. Y., has closed the ordinary routes in that vicinity and it would be best for one making the Elmira trip to take the Big Tree road from Batavia through East Bethany, Pavillion and Peoria to Mt. Morris and reach Dansville from Mt. Morris, N. Y., by taking the splendid road past Craig Colony, N. Y. Howard Martin, secretary-treasurer of the Albany Automobile Club, says that the main route between Albany, N. Y., and Pittsfield is closed on account of highway construction from the village of East Schodac to Nassau, a distance of 5.5 miles.

League Building a Road—P. M. Milner, the president of the Motor League of Louisiana, is endeavoring to interest motorists in the good roads convention called at Baton Rouge for August 12 by Governor Sanders. The governor is determined to construct a road from New Orleans to Baton Rouge on each side of the river, and this project is dear to the hearts of the motorists, who on their own initiative are already constructing a road to Chef Menteur. The governor has allowed twenty-three convicts to aid in building the road to Chef Menteur, the only expense to the motorists being for foremen and guards. The city also has appropriated $2,000 to assist in the work. The road will be 23 miles long from Canal street to the Chef along the shore of Lake Borgne. The road will be made at least 20 feet wide the entire distance. It will be graded and crowned. Dues of members of the motor league are used to apply to the construction of the roadway.

Wants a Beach Meet—The Sea Isle Motor Club will ask the A. A. A. to sanction a beach meet which it contemplates running off on the 2-mile New Jersey course in front of the town on August 28.

Brush Collecting Mail—Atlantic City has a Brush doing mail collection and delivery duty with excellent results. The local agent, Charles Hinckleman, made the deal with the government, and the little car is a big improvement over the former horse-drawn wagons.

After Gopher Scorchers—The Minneapolis Automobile Club is working hand-in-hand with the county officials in an effort to stop speeding on the boulevards between the city and Lake Minnetonka. Reckless driving has been prevalent there for some time and has aroused a storm of disapproval from the rural residents. Constables have established speed traps and strong effort will be made to nab the offenders.

Another Track Gone—The Meadows, the popular racing course for horses near Seattle, is now a thing of the past and in its stead will be a speedway for motor cars. Work has been begun on the reconstruction to convert the speedway into a saucer-shape track for the racing cars that are now definitely announced to be at Seattle September 8 to 11 to participate in the motor carnival to be held under the auspices of the Alaska-Yukon Pacific exposition and the Seattle Automobile Club.

Judge Investigates—Police Judge S. B. Snyder, of Council Bluffs, finds himself in a position which is most embarrassing. Himself a motorist, he is continually compelled to pass on cases for violation of the speed limit, and it tears his heartstrings to be obliged to fine the motorists from Omaha who go over to Council Bluffs to demonstrate the speed qualities of their machines. In order to determine for himself what constitutes a violation of the speed limit, which is 10 miles an hour in Council Bluffs, Judge Snyder made a trip in his own car and timed himself for 1½ miles. He made the distance in 7½ minutes, when, to be within the law, he should have consumed 10 minutes in the trip. He handed down his personal opinion that 20 miles an hour is slow enough for any motor car to go and that 10 miles an hour is "mighty slow." However, he announced that he would be guided by the law, despite his private beliefs.

Power Wagon on Overland Run—J. V. Carr, of the Grabowsky Power Wagon Co., has started on a trip from Detroit to California for the double purpose of establishing an endurance record such as has never yet been attained by a commercial car, and also with the idea of making demonstrations of the car at certain points along the route.

Motor Car Popular—Washington county, Pennsylvania, now claims 151 motor car owners. More than half of these reside in the rich old town of Washington, famous for its coal wealth and its Washington and Jefferson college. No town of its size in Pennsylvania boasts of so many and so costly cars, a large proportion of which are owned by retired farmers who have sold their coal lands and moved into the classic town.

Want Lights at Night—The police of Hartford, Conn., are rigidly enforcing the lantern law, which requires that all rubber-tired vehicles shall display a light between specified hours from sunset to sunrise. The attempt to make all vehicles display lights did not get through the legislature, but it still holds in so far as the rubber-tired variety is concerned. Of late there have been many violations of the ordinance—and not by motorists, either.

Must Remove Obstructions—Motorists in the vicinity of Duluth, Minn., are delighted with an order issued by the county board last week calling upon settlers along county roads to cease obstructing the roads and instructing counsel for the board to begin prosecution for violations of the order. In many cases where roads were little used farmers took the liberty of fencing in the right of way and also of piling building material in the road when they were constructing their fences. Motorists frequently came to grief on dark nights by running into a fence or a pile of building material. The settlers are warned that under no circumstances must they place obstruction in any road, no matter how little used it may be.

VIEW ON CHEYENNE'S NEW MOTOR SPEEDWAY

Among the Makers and Dealers

EMPLOYES OF THE AJAX-GRIEB COMPANY IN FRONT OF BIG TIRE-MAKING PLANT

Is Making Cylinders—The Frontier iron works, manufacturing motor car cylinders, recently opened in Buffalo.

Liberty Center's Garage—The new building being erected by Samuel Rigal at Liberty Center, O., is nearing completion. When finished the first floor will be occupied by Graner & Warner as a garage.

Will Build Cars—The Imperial Motor Car Co. has been organized at Hamilton, O., by George A. and Fred B. Rentschler, George H. and George S. Helvey and C. N. Carpenter. The company has bought a large paper mill plant at Hamilton and will equip it at once for manufacturing motor cars.

Chicago Removal—H. Paulman & Co., of Chicago, representing the Pierce-Arrow, have removed to their new building at 2420 Michigan avenue, being one of the first to take possession of the southern end of the row. The Overland branch is the latest to secure ground in this section. It will build at 2425 Michigan.

Will Make the Defiance—The Miller Machine Co., of Defiance, O., which for some time has conducted a garage in that city, has announced its intention of enlarging its business and embarking in the manufacture of motor cars. A factory building has been leased and a car of high grade to be known as the Defiance 40 will soon be turned on the market.

Gets Old Kinsey Plant—The Courier Car Co., of Dayton, O., recently incorporated with a capital stock of $200,000, has begun operations in the plant formerly occupied by the Kinsey Mfg. Co. The new concern is allied with the Dayton Motor Car Co., with which it will act in harmony. It will confine itself to the production of low-priced cars for the present. The recently-elected officers of the company are: President, C. G. Stoddard; vice-president, H. J. Edwards; secretary-treasurer, R. S. Fowler; directors, H. J. Edwards; J. F. Campbell, R. T. Houk, R. S. Fowler, H. S. Hayden and C. S. Jamison. B. A. Rhoads has been chosen superintendent of the company.

Franklin Branch Opened—A branch of the Franklin company at 683 Main street, Buffalo, has been opened, with George Ostendorf manager.

Making Wheels and Parts—The Murray Safety Wheel and Axle Co., of Pittsburg, has been organized by James E., Thomas M. and Frank D. Murray, Bruce Carr and A. H. McClurg. It will manufacture wheels and parts.

Westinghouse Building Motors—Orders have been placed with the Westinghouse Machine Co. for 1,000 high-power motor car engines, the first of this kind of engine ordered from this company, and negotiations are said to be pending for upward of 50,000 more.

Capacity Is Doubled—The capacity of the plant of the Empire Mfg. Co., at Akron, O., will be more than doubled by additions which are now being planned. Charles Wickline, president of the company, announces that contracts have been made for the manufacture of motor car accessories, which will keep his concern busy for a long time to come. The new buildings will be started this fall and be completed in time for the opening of spring business.

Caters to Farmers—The Minneapolis Motor and Truck Co., a new concern just organized to make a three-cylinder two-cycle medium-priced car and also a convertible wagon for use on the farm. Land has been purchased and plans are being prepared for a new concrete factory and it is expected that by the first of the year the plant will be in full operation. The Handy Man is the name of one of the models to be put out. This wagon will have a 1-ton capacity and will be arranged so it can be used both for hauling product to market and as a family vehicle. An ingenious arrangement on the rear wheels permits of the attaching of a belt for use in sawing wood, pumping water and doing other chores on the farm.

To Copyright White Line—The F. B. Stearns Co., manufacturer of the Stearns, has made application to have the white-line radiator copyrighted.

Big Supply House Opened—The Automobile Co-Operative Association of America has opened a large supply house at 1615 Walnut street, Philadelphia, in charge of James S. Chamberlain, one of the vice-presidents.

Gets Olds and Overland—F. C. Van Der Hoof, formerly connected with the Philadelphia Ford branch and the Bergdoll agency, has returned to Philadelphia from the west with the Oldsmobile and Overland agencies, and is looking around for a suitable location.

Brass Foundry for Maxwell—The Maxwell-Briscoe Motor Co. has begun work on the new building in its Rand drill property at Tarrytown and the brass foundry will be ready September 1. It will employ 100 men. The addition is being built north of the Rand drill shops and the first section will be 70 by 80 feet and one end will be left for large additions to be built later.

New Franklin Branches—Six branches have been added to the list of the Franklin Automobile Co., which is a selling company for the H. H. Franklin Mfg. Co. and which already had three branches, in New York, Chicago and Boston. The half dozen new ones are in San Francisco, Pittsburg, Buffalo, Rochester, Albany and Syracuse, in the latter of which cities the Franklin motor cars are made. The managers of the new branches are respectively John F. McLain, W. F. Reynolds, George Ostendorf, F. H. Sanders and George E. Messer, with the appointment for Albany yet to be announced. Each of the appointees has been a district representative for the Franklin company. In connection

with these selections is announced the appointment of T. R. Lippard as assistant general manager of the Franklin Automobile Co.

Change of Name—The name of the Trenton Rubber Mfg. Co., of Trenton, N. J., has been changed to the Thermoid Rubber Co., making Thermoid brake lining.

Making Gray Castings—The Muncie Foundry and Machine Co., of Muncie, Ind., has equipped its plant for the purpose of making a specialty of gray iron castings for motor car, boat and power gas engines. A. C. Lipsitz is manager and Edwin C. Slatery superintendent.

Building a New Place—The Mitchell Automobile Co., of Milwaukee, has started work on the erection of a garage and salesroom at Broadway and Martin street, adjoining the site for the new $150,000 central fire station. It will be of fireproof construction, one story high, and cost $7,500.

Indianapolis Garage Sold—The Meridian place garage, at Meridian and Twenty-second streets in Indianapolis, has been sold by John S. Lazarus to C. W. Allison and A. L. Duggan. Mr. Lazarus built the garage recently in the heart of the exclusive residence district in order to give his son Roy a business to look after.

Thomas Branch in Chicago—A branch of the E. R. Thomas Motor Co. has been opened in Chicago, locating temporarily at 1323 Michigan avenue until a permanent home can be built. C. T. Paxson has been appointed manager. The Shaw company hereafter will devote its attention to selling the imported Berliet and the Columbus electric.

Car Factory in Atlanta—That Atlanta, Ga., had a motor car factory within its borders did not creep into the newspapers until this week, when the White Star company turned out its first car. This company has hitherto done a small business in high-wheeled cars, but is now manufacturing a four-passenger 30-40-horsepower machine. Clarence Houston is president of the company, which is capitalized at $150,000. It is at present manufacturing cars at the plant of the Atlanta Buggy Co.

Plant for Gary Car—The factory, machinery and assets of the Multi-Unit Gas Engine Co., of Chicago, have been taken over by the Gary Motor Car Co., of Muskegon, Mich. The stockholders of the gas engine company are the incorporators of the new motor car company and the transfer was made in return for stock in the new enterprise. The multi-unit engine will be used on the Gary car. It is the intention of the company to remove the plants of the gas engine company at Sheboygan Falls, Wis., and Connersville, Ind., to this city. The officers of the Gary company are: President, J. J. Maloney, Chicago; vice president, John Q. Ross, Muskegon; treasurer, John H. Moore, Muskegon, Mich.; secretary and assistant treasurer, W. L. Simonton, Chicago. These, with A. C. Gary, of Chicago, form the board of directors.

Superior's New Industry—Articles of incorporation have been filed by the Superior Motor and Machine Works, of Superior, Wis. The capital stock is $15,000, and the incorporators are Solon L. Perrin, H. J. O'Brien and H. C. Lavery.

Building at Bellevue—A building site has been purchased by Fred Leinhard on Main street, at Bellevue, O., where he will erect a garage. A commodious sales room will also be maintained under the supervision of Charles Lamm, of Clyde, O.

Milwaukee Livery Service—The Stearns Auto Livery Co. has been incorporated in Milwaukee by A. F. Eckstein, J. E. Moore and H. T. Eckstein. The capital stock is $1,000. The company is an auxiliary to the Wisconsin Auto Exchange, agent for the Stearns and other lines.

To Make Lighters—The instantaneous Lighter Co., of Columbus, O., with a capital of $30,000, has been incorporated to equip a factory in Columbus for the manufacture of a lighting apparatus for motor cars. F. C. Barger is president and secretary, Byron L. Barger treasurer and the other directors are W. A. Barger, G. M. Barger and H. S. Barret.

Will Enlarge Business—The Protheroe & McGinnis Auto Machine Co. has been organized at Baraboo, Wis., by Robert W. Protheroe and James F. McGinnis. Mr. Protheroe has been engaged in general machine work and has been agent for the Buick for several years, and Mr. McGinnis has purchased a half interest. The business will be greatly enlarged.

Result of the Glidden—A. O. Brooks, of the Ettwein Motor Co., of Kansas City, has taken the agency of the Lexington. This car, made at Lexington, Ky., made a creditable showing in the Glidden tour and attracted much attention in Kansas City. Other newcomers in Kansas City are the Ohio, made at Cincinnati, for which the Cowherd Motor Co. has accepted the agency; the Empire, to be handled by Louis Robertson, manager of the Franklin agency, and the Cartercar, exploited by the Cartercar company. There are now eighty-two different makes of gasoline and steam cars with agencies in Kansas City.

New Pittsburg Concern—The Duquesne Automobile Co. has been formed at Pittsburg with a capital of $3,000, by George A. Holliday, Kirk J. Bigham and B. F. Nimick, of Pittsburg.

Koehler's Line—The H. J. Koehler Co. has secured a large slice of the eastern territory for the Rider-Lewis and Hupmobile and will also market its own car, the Koehler Forty.

Schreiber Company Incorporates—The Schreiber Motor Car Co., of Milwaukee, Wis., state agent for the Locomobile and Knox, has been incorporated with a capital stock of $25,000. The list of incorporators includes Herman F. Freidner, Robert G. Washold and John P. Foley.

New Lemoine Representative—Lavalette & Co., of New York, are no longer the representatives of the Etablissements Lemoine, it is announced. The International Engineering Co. is now handling the products of the house of Lemoine, among which are springs, axles, forgings and steel.

Segregates Commercial Cars—A separate department for commercial cars is being established by the H. H. Frankling Mfg. Co. in a building in Syracuse recently leased by the company in order to provide space in excess of that of its factory a block away. Heretofore the commercial car work has been a part of the general work of the factory. The company has established this separate commercial car department with Herbert Hess as manager and W. F. Kneip in charge of the engineering staff.

Transfer Company Organized—The Appleton Auto Transfer Co. has been organized at Appleton, Wis., with a capital stock of $10,000 and the support of the Appleton Merchants' Association, to operate a passenger and baggage line between Appleton and New London, Wis., via Black Creek, Shioeton, Hortonville and Stephensville. Two trucks, a twelve-passenger and a 1-ton truck, will be purchased. Two trips will be made each day, each truck starting at opposite points. M. D. Parmenter, secretary of the Merchants' association, is manager.

AMERICAN MOTOR AND CYCLE CO. HANDLING FRANKLIN AT BATTLE CREEK, MICH.

Brief Business Announcements

Portland, Ore.—The Oregon Taxicab Co. has just inaugurated a public taxi service and is to use Fiat cars.

Louisville, Ky.—A permit has been granted to J. J. Gaffney for the erection of a two-story garage at Second and Walnut streets.

Utica, N. Y.—In the future the Studebaker car is to be represented in this city by I. R. Gardiner, who is also to continue to market the Franklin and Elmore cars.

Weaverville, Cal.—The Weaverville Automobile Co. has been organized with a capital of $25,000 to operate a motor bus line between Weaverville and Redding. The trip by stage now takes 12 hours.

Austin, Tex.—The American Motor Car Co., of Texas, a corporation having its headquarters in Carson City, Nev., has been granted a permit to do business in this state. The state headquarters are to be located at Dallas.

Houston, Tex.—The Parmele-Wroe Automobile Co., which is now located at Capitol and Fannin streets, has just closed a contract for the erection of a one-story brick building on the latter's property at Main and Walker streets.

Owosso, Mich.—Robbins Brothers, proprietors of the Robbins Table Co., have bought the only garage in this city from William Rust, and are planning to erect a large addition and install a number of new cars. E. W. Robbins is to be manager.

New York—Frank Bowen, who for a number of years was head agent for the Ford company, and more recently connected with the Harry S. Houpt Co. during its representation of the Thomas car, is now connected with the Carl H. Page Co., and in the future is to devote his entire attention to the interests of the Chalmers-Detroit.

Muncie, Ind.—The Muncie Motor Truck Co. has been organized and is to establish a plant either in this city or in Yorktown, for the manufacture of motor trucks. D. O. Skillen, the glass manufacturer of Yorktown, Thomas L. and Hugh Warner, makers of parts, and M. E. Ailes, vice-president of the Riggs National bank, of Washington, D. C., are among those interested in the new plant.

Owego, N. Y.—At a meeting of the Business Men's Association, held last week, it was decided to raise $5,000 to be devoted to the erection of a new plant for the manufacture of a new motor car. W. H. Ives, who is the manager of the Reliance Motor Cycle Co., is interested in the new car, and has agreed to finance the scheme, provided that the Business Men's Association will contribute the $5,000 necessary for the erection of the building. Several Buffalo parties are also interested in the plan.

Hartford, Conn.—Charles E. Miller, dealer in supplies, is planning to open a new branch store at 274 Trumbull street.

Harrisburg, Pa.—The Keystone Auto Supply Co., of Norristown, has been incorporated with a capital stock of $15,000 by J. S. Boyd.

Cleveland, O.—The Rauch & Lang Carriage Co. is making considerable additions to its plant on West Twenty-fifth and Twenty-sixth streets.

Springfield, Ill.—The capital stock of the Standard Automobile Co., of Chicago, has been increased from $30,000 to $50,000, and in the future the number of directors is to be four instead of three, as heretofore. The Excelsior Automobile Supply Co., also a Chicago corporation, has increased its capital stock from $10,000 to $50,000.

Trenton, N. J.—Harry S. Wright, receiver for the Walter Automobile Co., sold at the direction of the court of chancery the plant of the defunct concern for $83,000. The purchaser was Judge George W. MacPherson, who was acting for the bondholders, and more than a dozen persons from Philadelphia bid upon the property. The plant is at the present time occupied by the Mercer Automobile Co. and the stockholders, formerly bondholders of the Walter company, plan to take over the plant at once. F. W. and Charles G. Roebling, John L. and Rudolph Kuser are at the head of the new company.

Trenton, N. J.—J. Chauncey Van Horn, who is the local agent for the Overland, is planning the erection of a garage in the rear of his house in Villa Park.

Albany, N. Y.—The McKinnon Chain Co., of Buffalo, has been incorporated with a capital stock of $1,000,000, to manufacture chains of all kinds, including motor car chains.

Indianapolis, Ind.—The Delaware garage, 215 North Delaware street, has been entirely remodeled and overhauled and is once more open for business. Paul R. John is to act as the general manager.

Columbus, Wis.—The Badger Automobile Co., which was recently incorporated with a capital of $100,000, has bought a tract of 20 acres in this city, and is to commence the erection of a plant at once.

Philadelphia, Pa.—The Empire Tire Co., of Trenton, N. J., has just opened a branch in this city at Broad and Wood streets, in the old quarters of the Gilmore supply house. The branch is to be under the management of E. B. Richardson. The new branch plans to conduct both a wholesale and retail business.

St. Joseph, Miss.—The Robinson Auto and Supply Co. has just filed articles of incorporation with a capital stock of $10,000. W. H. Robinson is to act as president and general manager, Leo Muchenberger first vice-president and assistant manager, R. R. Calkins treasurer and Kenneth Robinson secretary.

Detroit, Mich.—The Griswold Motor and Body Co., a new concern, has just purchased the property of the American Folding Go-Cart Co., on Commonwealth avenue. H. F. Marsh is the president of the Griswold company, N. Griswold vice-president, A. F. Marsh secretary and general manager and E. F. Day superintendent.

Pontiac, Pa.—The Beaudette Body Works is shortly to begin the erection of a large addition to its present factory. The Pontiac Auto Top Co., which is to engage in the manufacture of tops, has been recently organized, and will soon be in operation. Another new concern is the Auto Body and Trimming Co., which has just been organized.

Omaha, Neb.—The McKeen motor car shops, which is engaged in the manufacture of gasoline motor cars for the use of railroads, has announced that orders have been placed for sufficient machinery to double the output of the factory, which at present employs 300 workmen. Last week the concern made a shipment of cars to the Sonora railroad in Mexico.

Indianapolis, Ind.—Meteor Motor Car Co., capital stock $10,000. Incorporators, L. Carter, C. P. Henderson, A. B. Lathrop, R. P. Henderson.

Elkhart, Ind.—Crow Motor Car Co., capital stock $50,000. Incorporators, E. P. Crow, F. A. Howe, and M. E. Crow.

Albany, N. Y.—Albany Berne Auto Line, capital stock $20,000; to operate a state line. Incorporators, E. L. Shea, Frank Tompkins, Henry Binns and W. T. Cheseboro.

Everett, Mass.—Everett Auto Station, Inc., capital stock $2,000, to deal in motor cars. Elmore Andrews is president and S. J. Lea is treasurer.

Milwaukee, Wis.—Wordingham Mfg. Co., capital stock $50,000, to manufacture foot horns and other accessories for motor cars. Incorporators, W. G. Wordingham, P. Kennedy and W. R. Greenlaw.

New York—C. F. Splitdorf Co., capital stock $500,000, to manufacture electrical machinery, ignition apparatus, motor car parts and sundries. Incorporators, C. F. Splitdorf, John Splitdorf and P. J. W. Kelly.

New York—Husson Motor Co. of America, capital stock $12,000, to manufacture gas engines, motors, machines, motor cars, aerial vehicles, motor boats, etc. Incorporators, John Husson, J. J. Hogan, W. E. Young.

Trenton, N. J.—Trenton Taxicab Co., capital stock $5,000. Incorporators, Nicholas Snyder, Joseph G. Burch and Frank M. Snyder.